

Young Nak Project Oak Tree Report

Los Angeles County, California

Prepared for:

Youngnak Presbyterian Church of Los Angeles
1721 N. Broadway
Los Angeles, California 90031

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1.0 EXECUTIVE SUMMARY

	Number of Oak Trees	Oak Tree Tag Number
Total Number of Oak Trees Surveyed	271	See, Appendix B: Oak Tree Survey Data
Total Number of Oak Trees Planned for Removal	8	Valley Oaks – #2601, #2758, #2862 (heritage), #2886 Interior Live Oaks – #2741, #2759, #2760, #2761
Total Number of Oak Trees That May be Encroached During Grading Activities	10	Valley Oaks – #2608, #2609, #2646, #2647, #2648, #2655, #2742, #2843 Interior Live Oaks – #2765, #2766
Total Number of Oak Trees That Would <u>Not</u> Be Removed or Encroached, But Occur within 200 Feet From Grading Limit Line	253	See, Appendix A: Oak Tree Survey Data
Total Number of Oak Trees that Would Require a Los Angeles County Oak Tree Permit (Removed+Encroached)	18	#2601, #2608, #2609, #2646, #2647, #2648, #2655, #2741, #2742, #2758, #2759, #2760, #2761, #2765, #2766, #2843, #2862 (heritage), #2886

2.0 INTRODUCTION

Pursuant to the Los Angeles County Oak Tree Ordinance, removal or damage of any tree of the oak genus (*Quercus*) that is 25 inches in circumference (8 inches in diameter), or has a combined trunk circumference of any two trunks of at least 38 inches (12 inches in diameter), as measured 4.5 feet above the mean natural grade (i.e., diameter at breast height [DBH]), is unlawful without a permit (County Ordinances 82-0168 and 88-0157; Los Angeles County Zoning Code, Section 22.56.2060(A)). Damage is defined as any act causing or tending to cause injury to the root system or other parts of an oak tree, including, but not limited to, burning, application of toxic substances, operation of equipment or machinery, paving, changing of natural grade, and trenching or excavating (i.e., encroaching) within the protective zone (the area within the dripline of an oak tree and extending to a point at least 5 feet outside the dripline, or 15 feet from the trunk[s] of a tree, whichever distance is greater) of an oak tree.

An oak tree that has a trunk DBH equal to, or greater than, 36 inches is considered a heritage tree, as defined in the Los Angeles County Oak Tree Ordinance (County Code 22.56.2090(F)(1)(e)).

2.1 Purpose

As required by the County of Los Angeles and pursuant to Section 22.56.2090 of the Los Angeles County Code, the purpose of this oak tree report is to provide information to the County on oak trees that may be removed or damaged by the development of the Young Nak project (Conditional Use Permit 03-221). The parameters used to evaluate each surveyed tree are described below under heading 3.0, **METHODS**.

2.2 Site Location and Project Description

The 30.5-acre Young Nak Retreat Center project site is located at 24100 Pine Canyon Road, in the northwestern portion of Los Angeles County. The site is located west of the community of Lake Hughes, California approximately 15 miles southeast of State Route 138 (SR-138) and the Interstate 5 interchange. The project site is approximately 20 miles north of Santa Clarita and approximately 70 miles south of Bakersfield California. The site is currently used as a church retreat and contains 20 mobile home units, one permanent single-family dwelling, a detached laundry/restroom, a network of unpaved footpaths, and several paved and unpaved access roads. The project site is bordered to the north by Pine Canyon Road, to the south by the Angeles National Forest, and to the east and west by private property.

A regional location map (**Figure 1, Regional Location**) and a site vicinity map (**Figure 2, Vicinity Map**) illustrate the project site in a regional and local context, respectively. Currently, the following plant communities dominate the project site: Willow Riparian Woodland.

A map depicting the site plan and daylight grading limits, with all protected tree locations is provided in **Appendix A**. A proposed on-site oak tree restoration area is also depicted on this map.

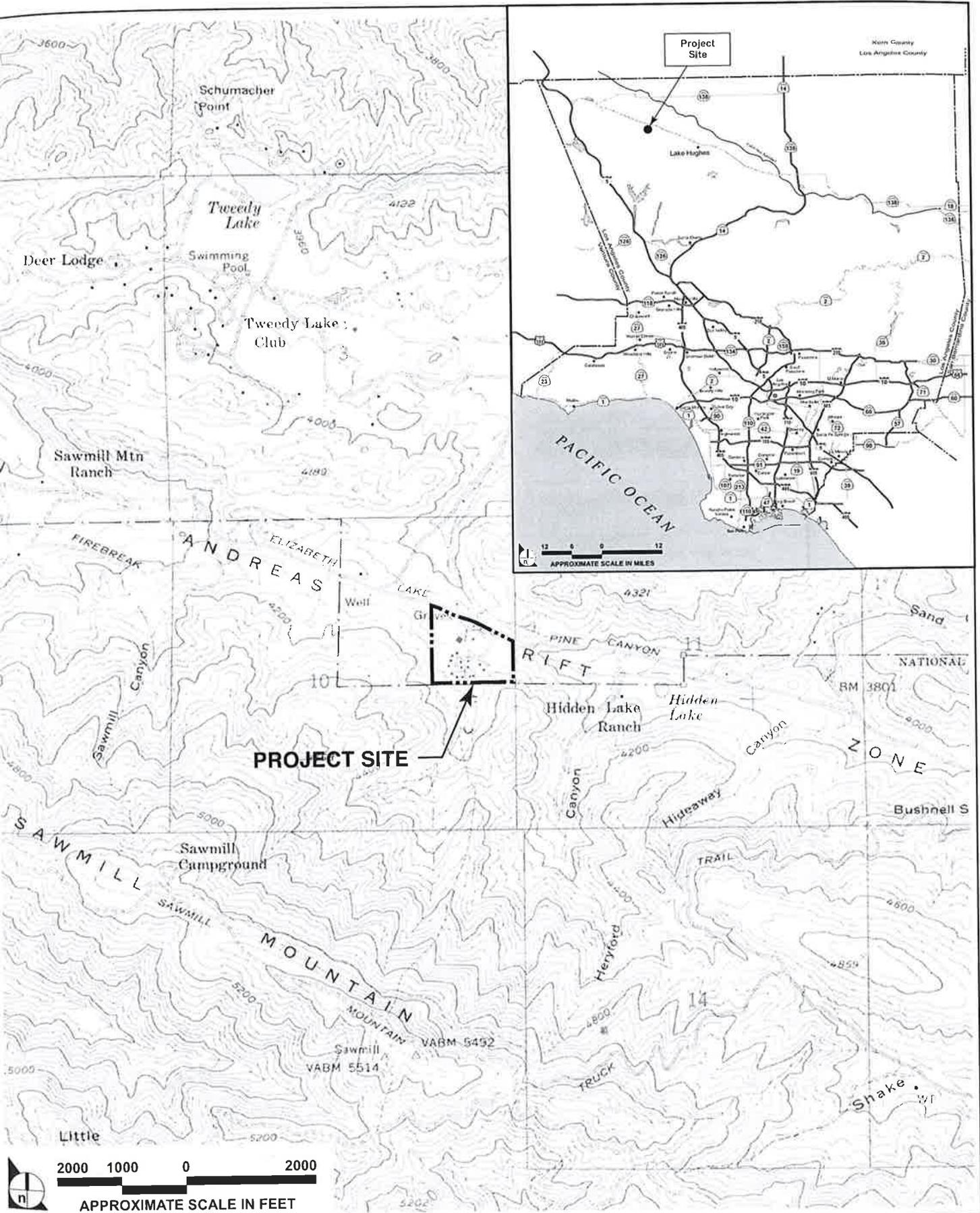
3.0 METHODS

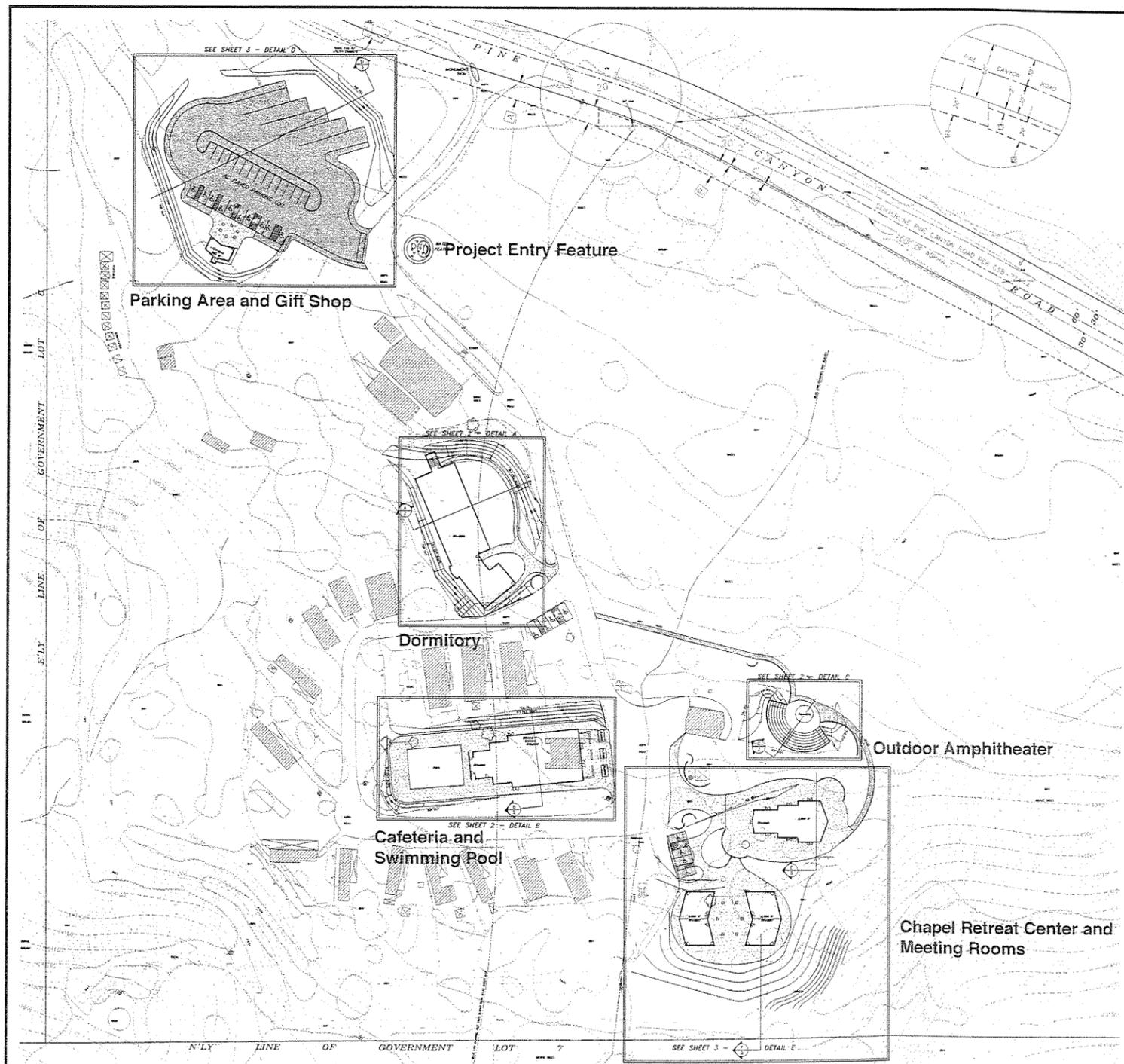
Impact Sciences biologists conducted on-site surveys and evaluations of the oak trees in the fall and winter of 2005/2006. Only oak trees protected under the Los Angeles County Oak Tree Ordinance were surveyed (i.e., oak trees that meet the minimum trunk diameter for protection). The project site was traversed on foot through areas where oak trees occur. Oak tree locations and attribute data were collected from the base of each tree with a Trimble Global Positioning System (GPS) mapping grade system. The GPS stores the spatial data with the evaluation criteria and attribute information required per the County's Oak Tree Ordinance.

Field evaluations of all oak trees surveyed included the following:

Tree Characteristics

- Measuring the diameter of the trunk of each (ordinance size) oak tree using a forester's steel diameter-equivalent tape measure. Trees with multiple trunks were measured at breast height and measurements for up to five trunks were measured in the field. The total number of trunks of trees with more than five trunks were noted in the comment section of the data spreadsheet (**Appendix A**);
- Measuring height and crown radius for each tree in all directions (north, south, east, and west);
- Characterizing the balance or symmetry of each oak tree based on the crown radius measurements and whether or not the tree was leaning or unstable; and
- Identification of trees that are classified as heritage oak trees.





EASEMENTS:

- A ROAD DEED TO LOS ANGELES COUNTY, RECORDED APRIL 27, 1962 AS INSTRUMENT NO. 3541.
- B ROAD DEED AND GRANT OF EASEMENT TO LOS ANGELES COUNTY, RECORDED MAY 17, 1994 AS INSTRUMENT NO. 949594.
- C ROAD DEED AND GRANT OF EASEMENT TO LOS ANGELES COUNTY, RECORDED MAY 17, 1994 AS INSTRUMENT NO. 949594.

BASIS OF BEARING:
 BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE OF PINE CANYON ROAD EAST OF THE EAST SECTION LINE OF SECTION 10 BEARING N 85°30' 50"W HAVING A DISTANCE OF 935.61 FEET AS SHOWN ON CSE-774-4.

PARKING DATA:
 PARKING STALLS: 14
 HANDICAPPED PARKING: 18
 BUS STALLS: 5

BENCH MARK:
 BM-111-50 1960 RCE 5869
 L.A. COUNTY ENGINEER BRASS CAP
 IN THE CITY OF LAKE HUGHES, PINE CANYON ROAD, APPROXIMATELY 12 FEET EAST OF THE WEST ENTRANCE TO 24100 PINE CANYON ROAD, APPROXIMATELY 12 FEET SOUTH OF PINE CANYON ROAD IN CONCRETE SLAB.
 ELEVATION: 4030.726 1929 DATUM

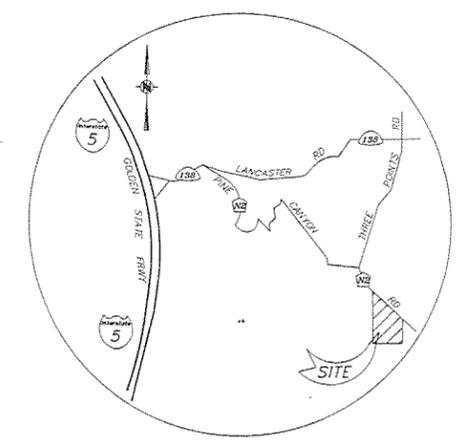
ZONING:
 C3 (UNLIMITED COMMERCIAL)

ZONE W NOTE:
 ZONE W REQUIREMENTS ARE BEING MET AS LONG AS ALL CURRENT AND FUTURE ACTIVITIES ARE CONFINED TO PRIVATE PROPERTY.

LAND AREA:
 30.5 ACRES

FLOODZONE DATA:
 THIS SITE LIES ON ZONE C PER FIRM MAP COMMUNITY PANEL 065043 0050 B DATED DECEMBER 2, 1980

- LEGENDS:**
- PROJECT BOUNDARY
 - EXISTING GRADE CONTOUR
 - PROPOSED GRADE CONTOUR
 - CUT SLOPE
 - FILL SLOPE
 - DAYLIGHT LINE
 - EXISTING SPOT ELEVATION
 - DIRECTION OF FLOW
 - PROPOSED AC PAVEMENT
 - PROPOSED PCC PAVEMENT



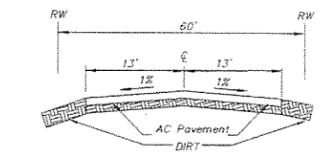
VICINITY MAP
 NO SCALE

INDEX OF SHEETS:

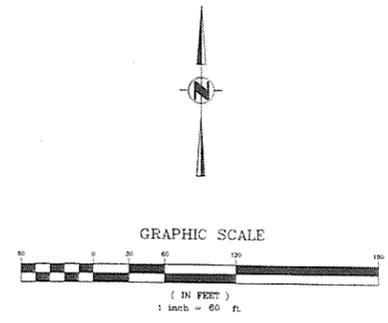
OVERALL SITE PLAN	SHEET 1
DORM, CAFETERIA & AMPHITHEATER GRADING PLAN	SHEET 2
PARKING, RETREAT & MEETING ROOM GRADING PLAN	SHEET 3

ASSESSOR'S PARCEL NO.
 3243-014-021

PROPERTY OWNER:
 YOUNG-NAK PRESBYTERIAN CHURCH OF LOS ANGELES
 1721 N. BROADWAY AVE.
 LOS ANGELES, CA 90031



TYPICAL SECTION
 PINE CANYON RD



DIAL TOLL FREE
 1-800-422-4133
 AT LEAST TWO DAYS
 BEFORE YOU DIG

NOT FOR CONSTRUCTION

NO.	DATE	REVISIONS	BY	APPR	LEGAL DESCRIPTION: THAT PORTION OF SECTION 10, TOWNSHIP 7 NORTH, RANGE 16 WEST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND, FILED IN THE DISTRICT LAND OFFICE ON AUGUST 25, 1903, BEING THE NORTHERLY LINE OF PINE CANYON ROAD, AS GRANTED TO THE COUNTY OF LOS ANGELES BY DEEDS RECORDED ON JULY 11, 1933, AS INSTRUMENT NO. 671, IN BOOK 12220, PAGE 288, OFFICIAL RECORDS, AND ON MAY 22, 1934 AS INSTRUMENT NO. 607, IN BOOK 12816, PAGE 75, OFFICIAL RECORDS OF SAID COUNTY, EASTERLY BY THE EAST LINE OF SAID SECTION 10, SOUTHERLY BY THE NORTHERLY LINE OF GOVERNMENT LOT 7 OF SAID SECTION AND WESTERLY BY THE EASTERLY LINE OF GOVERNMENT LOT 6 OF SAID SECTION.	BENCHMARK: BM 111-50 1960 RCE 5869 DESCRIPTION: LOS ANGELES COUNTY ENGINEER BRASS CAP LOCATION: 12 FEET EAST OF THE WEST ENTRANCE TO 24100 PINE CANYON RD, 12 FEET SOUTH OF PINE CANYON RD IN CONCRETE SLAB RECORDED FROM: LANCASTER QJND 1929 ELEVATION: 4030.726 DATUM: 1929	PLANS PREPARED FOR: Legacy Construction & Development, Inc. Bob Niesner 31560 Via Colinas Suite 108 Westlake Village, CA 91362 Phone (818) 879-4619 Fax (818) 879-4654	PLANS PREPARED BY: HOVELL & PILARSKI ENGINEERING, INC. Simi Valley, California (805) 522-1900 GERALD F. HOVELL, R.C.E. 33118	SHEET 1 PRELIMINARY GRADING PLAN 3 SHEETS GR XXXXXXXXXXXX YOUNG-NAK RETREAT CENTER 24100 PINE CANYON ROAD Lake Hughes, California GERALD F. HOVELL R.C.E. 33118 EXP. 6-30-06 DATE
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Source: H&P Engineering - 01/05

Physical Condition

- Identification of damage caused by pathogens or insect pests, by natural causes such as lightning, or from human activity;
- Evaluation of vigor based on such parameters as amount of new growth, leaf color, abnormal bark, dead wood, evidence of wilt, excessive necrosis or leaf necrosis, thinning of crown, etc.; and
- Assessment of overall health based on the evaluation of vigor, presence of damage, and comparison of typical archetype tree of same species.

Recommended Measures

- Identification of whether the tree requires safety pruning, such as the removal of dead or weak branches, and if a cable or brace should be installed if the tree is to be retained and would not be impacted by proposed development.

Grade

- A subjective alphabetical ranking ("A" being best and "F" being worst) was assigned for vigor, overall health, aesthetic value, and balance for each tree based on the criteria described below. Photographic examples of the alphabetical rankings for each of the four aforementioned survey parameters are shown in **Figures 3** through **8**.

"A" = Excellent: A healthy and vigorous tree characteristic of its species and reasonably free of any visible signs of stress, disease, or pest infestation.

"B" = Good: A healthy and vigorous tree with minor visible signs of stress, disease, or pest infestation. Some maintenance measures may need to be implemented, such as pruning of dead wood or broken branches.

"C" = Fair: Although healthy in overall appearance, there is abnormal amount of stress or disease/insect infestation, and a substantial amount of maintenance may be needed.

"D" = Poor: A tree that may be exhibiting a substantial amount of stress, disease, or insect damage more than is expected for the species. The tree may be in a state of rapid decline, and may manifest various signs of dieback, necrosis, or other symptoms caused by pathogens or insect pests.

"E" = Nearly Dead: An unhealthy tree in which mortality is inevitable. Examples of such trees include those that may show signs of disease or pest infestation, have a substantial amount of defoliation, and appear to be a safety hazard.

"F" = Dead: A tree that has no foliage and exhibits no sign of life or vigor.



Figure 3 – Photo of Oak Tree with an “A” (Excellent) Letter Grade



Figure 4 – Photo of Oak Tree with a “B” (Good) Letter Grade



Figure 5 – Photo of Oak Tree with a "C" (Fair) Letter Grade



Figure 6 – Photo of Oak Tree with a "D" (Poor) Letter Grade



Figure 7 – Photo of Oak Tree with an “E” (Almost Dead) Letter Grade

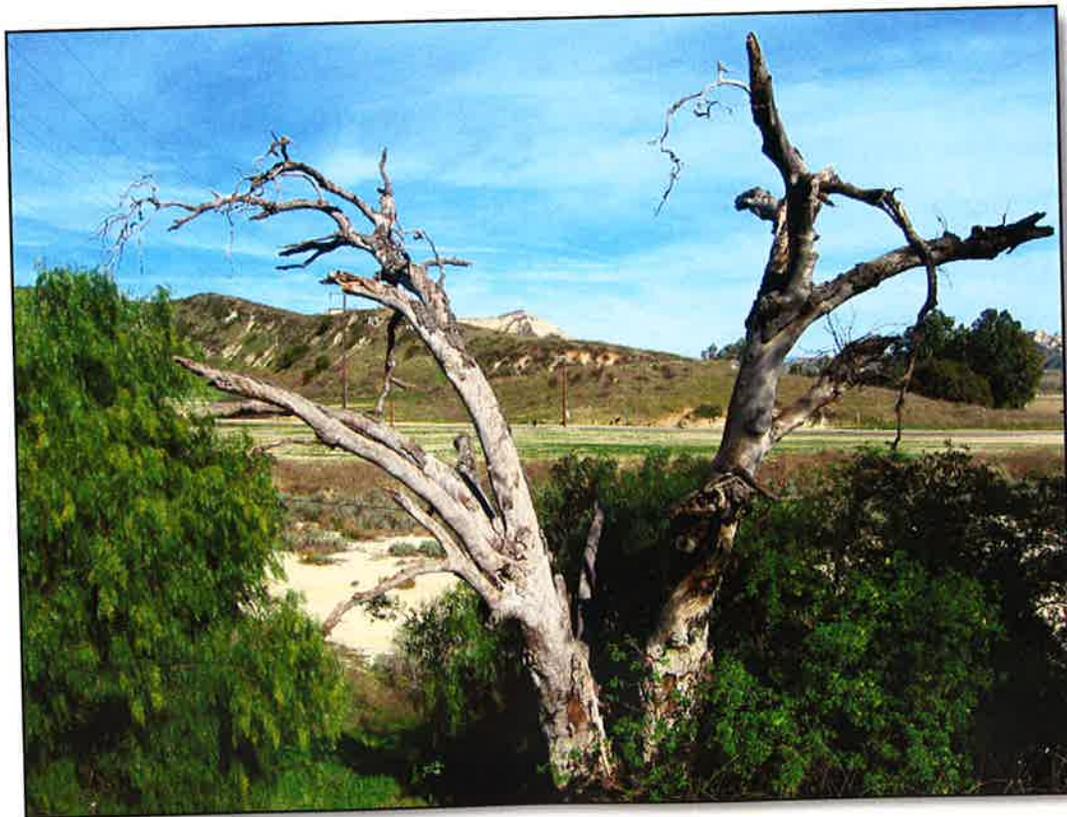


Figure 8 – Photo of Oak Tree with an “F” (Dead) Letter Grade

All oak trees surveyed within or adjacent to the Young Nak Project Boundary are displayed on the Oak Tree Location Map provided in **Appendix A**. This map depicts all Ordinance-size oak trees occurring within the proposed grading limits and within 200 feet of the grading limits line, including trees growing off site.

4.0 RESULTS

A total of 271 oak trees subject to the Los Angeles County Oak Tree Ordinance were surveyed within the Young Nak Project Site, which includes the area within the proposed grading limit line and all areas within 200 feet of the grading limit line (see **Appendix A**). Of the 271 oak trees surveyed, a total of 8 oak trees are planned for permanent removal, 4 of which are valley oaks (*Quercus lobata*) and 4 are interior live oaks (*Q. wislizenii* var. *frutescens*). Two of the interior live oaks proposed for removal (tree # 2741 and tree #2761) are substantially declining from a fungal disease that appears to be a result of oak root fungus (*Armillaria mellea*). It should also be noted that a total of four "dead" oak trees will be removed; however, such trees are not considered "removals," since a permit is not required for the removal of "dead" oak trees. One of the valley oak trees planned for removal is considered heritage trees under Los Angeles County Oak Tree Ordinance (Tree # 2862).

A total of 10 oak trees may be encroached or damaged by proposed grading and construction activities, as a result of activities occurring within the protective zone of the tree. There are 253 oak trees (74 percent of all trees surveyed) that occur within 200 feet of the grading limit line, none of which would be removed or encroached upon by construction-related activities.

A summary of the field data collected from the 2006 oak tree survey is shown in **Table 1, Oak Tree Impact Table**.

5.0 CONCLUSION

A total of 18 protected oak trees would be either removed or potentially damaged (encroached) by construction-related activities; therefore, these 18 trees would require an oak tree permit from the County of Los Angeles. The applicant is also requesting authorization for maintenance pruning of the oak trees with branches greater than 2 inches in diameter on an as need basis and with prior County forester approval.

Table 1
Oak Tree Impact Table

	Number of Oak Trees (% of trees surveyed)	Oak Tree Tag Number
Total Number of Oak Trees Surveyed	271 (100%)	Appendix B: Oak Tree Survey Data
Total Number of Oak Trees Planned for Removal	8 (2%)	Valley Oaks – #2601, #2758, #2862 (heritage), #2886 Interior Live Oaks – #2741, #2759, #2760, #2761
Total Number of Oak Trees That May be Encroached During Grading Activities	10 (3%)	Valley Oaks – #2608, #2609, #2646, #2647, #2648, #2655, #2742, #2843 Interior Live Oaks – #2765, #2766
Total Number of Oak Trees That Would <u>Not</u> Be Removed or Encroached, But Occur within 200 Feet From Grading Limit Line	253 (93%)	Appendix A: Oak Tree Survey Data
Total Number of Oak Trees that Would Require a Los Angeles County Oak Tree Permit (Removed+Encroached)	18 (6%)	#2601, #2608, #2609, #2646, #2647, #2648, #2655, #2741, #2742, #2758, #2759, #2760, #2761, #2765, #2766, #2843, #2862 (heritage), #2886

6.0 SUGGESTED MITIGATION MEASURES

Pursuant to Section 22.56.2090(F)(1)(d) of the Los Angeles County Oak Tree Ordinance, the following mitigation measures are proposed to preserve and protect the oak trees addressed in this report. These mitigation and maintenance measures are suggested to mitigate the loss and impacts to 18 oak trees and to preserve and protect the remaining oak trees on the site. As depicted in **Appendix A**, an on-site oak tree restoration area has been identified to plant replacement trees for the permanent loss of the 10 oak trees planned for removal.

MM-1 Replacement Trees

- All oak trees removed shall be replaced by a tree of the same species at a ratio of 2:1. All heritage trees that will be removed shall be replaced at a 10:1 ratio.
- All replacement trees shall be at least a 15-gallon specimen in size and measure 1 inch or more in diameter, as measured from 1 foot above the base. Free-form trees with multiple stems are permissible; the combined diameter of the two largest stems of such trees shall measure a minimum of 1 inch in diameter, as measured 1 foot above the base. Replacement trees shall consist exclusively of indigenous oak trees and be certified as being grown from a seed source collected in Los Angeles or Ventura Counties.

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MM-2 Protective Fencing

A plan shall be developed for protecting oak trees on the subject property during and after development. This plan shall be approved by the Forestry Division of the County of Los Angeles.

- *Equipment damage to limbs, trunks, and roots of all remaining trees shall be avoided during project construction and development. Even slight trunk injuries can result in susceptibility to long-term pathogenic maladies.*
- *Protective fencing not less than 4 feet in height shall be placed at the limits of the protective zone of any individual oak tree or dense stand of oak trees within 200 feet of the grading limits. This fencing shall be inspected by the forester and/or fire warden prior to commencement of any activity on the subject property, and shall remain in place until construction is completed.*

MM-3 Grading Restrictions Near Protective Zones

Care must be taken to limit grade changes near the protective zone of an oak tree. Grade changes can lead to plant stress from oxygen deprivation or oak root fungus at the root collar of oaks. Minor grade changes further from the trunk are not as critical but can negatively affect the health of the tree if not carefully monitored by a County-approved certified arborist.

- *The grade shall not be lowered or raised around the trunks (i.e., within the protective zone) of any oak tree without the approval of the Los Angeles County Forester or a County-certified arborist as specified in an approved oak tree permit. A certified arborist shall supervise all excavation or grading proposed within the protective zone of a tree.*
- *Trenching, excavation, or clearance of vegetation within the protective zone of an oak tree shall be accomplished by the use of hand tools or small hand-held power tools. Any major roots encountered shall be conserved to the greatest extent possible and treated as recommended by the certified arborist.*
- *No utility trenches shall be routed within the protective zone of an oak tree unless no feasible alternative locations are available, and shall be approved by the County Forester.*

MM-4 Equipment Storage

- *No storage of equipment, supplies, vehicles, or debris shall be permitted within the protective zone of an oak tree.*
- *No dumping of construction wastewater, paint, stucco, concrete, or any other clean-up waste shall occur within the protective zone of an oak tree.*
- *No temporary structures shall be placed within the protective zone of any remaining oak tree.*

MM-5 Maintenance

Healthy trees, if not maintained, often grow beyond their ability to support themselves and fail at their naturally occurring weakest point. This is typically at a branch union at or near the main crotch of the tree. Weight-reduction pruning and/or cabling is important in any tree preservation program. Pruning of oak trees within residential neighborhoods is recommended every four to six years, based on a County-certified arborist's determination.

- *Pruning of replacement oak trees and preserved oak trees shall include the removal of dead wood, stubs, and medium pruning of branches 2 inches in diameter or less.*
- *Pruning of replacement oak trees and preserved oak trees shall be in accordance with the guidelines published by the National Arborist Association. In no case shall more than 20 percent of the tree canopy of any oak tree be removed. Cuts over 2 inches in diameter shall require a pruning permit from the County. After pruning, installation of support cables to prevent future main crotch failures may be necessary based on a County-certified arborist's determination.*
- *All replacement oak trees shall be maintained in accordance with the principles set forth in the publication, Oak Trees: Care and Maintenance prepared by the Forestry Division of the Fire Department of the County of Los Angeles.*
- *A five-year maintenance period shall begin upon the start of planting the replacement trees. All replacement trees failing to survive within this period shall be replaced. A new five-year maintenance period shall start for each tree that failed to survive and required a replacement tree to be planted.*

MM-6 Frequency of Watering

Care should be taken to avoid placing any irrigation devices within watering distance of the protected zone of oak trees. Too much moisture near the base of an oak tree is generally believed to be the leading cause of death of oak trees in residential settings, and oak root fungus can occur as a result of over-watering. Oak trees survive and thrive on annual rainfall alone and generally do not require supplemental irrigation except during periods of extreme drought or for establishment of newly planted trees (i.e., replacement trees).

- *Irrigation water shall not reach within 15 feet of any oak trunk.*
- *Neither grass nor ground covers shall be planted under the canopy of oak trees.*

MM-7 Control of Diseases and Pests

Oak trees generally have an acceptable level of common insect pests. During the visual inspection of the trees assessed, no evidence of sudden oak death (*Phytophthora ramorum*) or bleeding canker (*Phytophthora cactorum*) was observed. However, oak wilt fungus (*Ceratocystis fagacearum*) was observed on two trees

on the project site. The parasite mistletoe (*Phoradendron villosum* ssp. *villosum*) is a common threat to oak trees; however, despite the negative effect mistletoe has on its tree hosts, both mistletoe and oaks are native to California and have co-existed and co-evolved for hundreds of years. Mistletoe was observed on several of the oak trees surveyed.

- *A County-certified arborist shall evaluate the effects of mistletoe, pathogens, and insect pests on the remaining preserved and planted oak trees periodically (about every five to seven years), in addition to the overall health and structural integrity of the trees, to ensure longevity of remaining oak trees.*

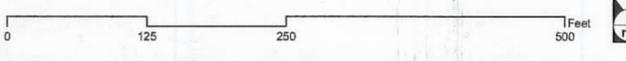
MM-8 Construction Monitoring

Damage to remaining trees must be avoided by workers and equipment during construction activities.

- *A qualified biologist or County-certified arborist shall monitor on-site construction and grading activities occurring near all identified oak tree protection zones to ensure that damage to oak trees does not occur.*
- *Prior to initiation of construction activities, the qualified biologist or County-certified arborist shall schedule a field meeting to inform personnel involved in construction where all protective zones are located and the importance of avoiding encroachment within the protective zones.*

APPENDIX A

**Oak Tree Location Map, Site Plan, and
Proposed On-site Oak Tree Restoration Area (Oversized Map)**



- Not Impacted
- Removed
- Impacted
- Tree Protective Zone
- Grading Limit Line
- Oak Tree Restoration Area
- 200 Feet from Grading Limits
- Approx. Property Boundary

Grading Limit Line obtained from Howell & Pflarski Engineering, Inc. Feb. 2006. (Line was Transformed.)
 Aerial Imagery obtained from Air Photo USA, 2003.
 Tree data collected by Impact Sciences, Jan-March, 2006, using sub-meter GPS.
 A tree protective zone was determined by taking the largest canopy distance and adding 5 ft.
 Protective Zone was only mapped for those trees within 50 ft. of the Grading Limit Line.
 Date: 03-21-06. File: G:\664-001_YoungOakMap\TreeResurvey_03\06.mxd

Oak Tree Location Map
(Appendix A)

APPENDIX B

Oak Tree Survey Data

Appendix B. Oak Tree Survey Data

Tree Number	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	2516				
Species																																				
Canyon Live Oak										X																										
Valley Oak			X				X																													
Scrub Oak																																				
Black Oak																																				
Interior Live Oak	X	X		X	X		X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
Black Oak									X																											
Heritage Oak																																				
Trunk Diameter	8	8,4,4,3,3,3,2	29	9,7,5,7	9,7,5,6,6	12	13,4	8,5,8,5	21	16,16,15,12,6	6,5,5,5	7,5	7,5,5,4,5	7,5,5,5	7,5,3,5	7,6,5,4	6,5,4,3,3	7,5,7,5	6,5,6,4,3,3,2	6,5,5,5	6,5,5,5,5	6,5,5	10,10,10	10,5	8,6,4,2	10,5	7,5,2	12,7	9,8	8,5	8	8,6				
Tree Height	17	18	47	20	32	32	30	20	25	40	24	13	25	23	20	19	17	24	28	20	22	21	38	30	24	36	28	32	30	25	18	19				
Canopy North	5	15	28	13	14	18	15	9	19	23	12	22	14	14	10	12	11	12	10	11	8	14	20	15	6	18	14	18	12	15	10	17				
Canopy West	5	3	23	12	14	15	12	10	8	22	9	4	8	7	7	14	12	7	14	12	10	12	15	14	13	16	13	12	15	5	11	12				
Canopy South	6	15	26	8	12	16	14	11	12	25	9	0	11	9	12	14	13	14	16	5	11	6	14	11	12	15	7	8	10	10	9	8				
Canopy East	8	14	28	13	12	15	13	11	16	27	12	5	4	8	7	7	6	15	5	9	12	4	12	9	8	10	9	13	4	13	4	1				
Tree Decline																																				
Broken/Dead				X				X																										X		
Sparse Foliage				X				X				X																								
Excessive Cavity				X				X						X	X									X										X		
Mainstem Damage														X						X														X		
Poor tip Growth				X																	X													X		
Cavity				X				X																										X		
Weak Crotch																								X										X		
Hollow Trunk																																				
Trunk Exudate																																				
Regrown Sprouts		X																																		
Exfoliating Bark																																				
Insect Damage													X																							
Diseased																																				
Mistletoe																																				
Leaning																																				
Excessive Wound												X																							X	
Surface Root																																			X	
Fire Scar																																				
Safety Hazard																																				
Safety Pruned																																				
Remove Deadwood																																				
Cable/Brace																																				
Vigor	C	B	A	D	B	B	B	C	B	A	B	B	C	C	C	C	C	B	B	C	B	B	B	D	C	B	B	B	D	B	D			X		
Health	C	B	A	C	A	A	B	C	B	A	B	C	C	C	C	C	B	B	C	B	B	B	D	C	B	B	B	D	B	D				C		
Aesthetics	D	C	A	D	A	B	C	D	C	A	C	D	C	D	C	C	C	B	B	C	B	B	C	D	C	A	A	B	D	B	D			C		
Balance	C	C	A	C	B	B	B	C	D	A	C	D	C	D	C	C	C	B	A	D	C	B	C	D	C	B	C	C	D	B	D			C		
Removal																																				
Encroached																																				
200 feet from																																				
Greater than	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Appendix B. Oak Tree Survey Data

Tree Number	2601	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630
Species																												
Canyon Live Oak			X	X	X	X	X	X															X	X	X	X	X	X
Valley Oak	X																											
Scrub Oak																												
Black Oak									X	X	X	X	X	X	X	X												
Interior Live Oak		X																										
Black Oak																												
Heritage Oak																												
Trunk Diameter	22	6,6,5,4,3	33	35	15,8	13	16	13	11,1,5	8,5,5,4	8,7,5,4	8,5	7,7	7,7,5	8,7,7,6,5,2	9,8,8,6,6,6,5	17,14	13	8,2,2	14	16	21	12,11,10,8,5,5	11,9,8,6	7,6,4	7,7,4	7,4,3,2,9	8,7
Tree Height	23	18	49	50	33	32	32	20	23	23	23	27	27	26	28	25	43	23	20	40	47	32	34	28	28	22	15	24
Canopy North	26	8	15	23	18	8	22	18	16	16	14	20	24	10	16	24	15	8	12	18	10	28	18	16	10	14	7	10
Canopy West	12	12	24	30	13	12	14	3	12	16	2	12	12	8	8	20	8	4	18	22	24	25	7	18	14	14	7	10
Canopy South	16	8	30	32	14	23	25	18	4	19	21	5	5	20	15	18	27	27	6	10	27	6	19	17	26	2	8	10
Canopy East	15	10	31	35	17	20	24	22	15	5	15	10	16	10	18	21	20	32	10	14	22	20	20	15	14	8	12	8
Tree Decline																							X					
Broken/Dead																												
Sparse Foliage																												
Excessive Canopy																												
Mainstem Damage																												
Poor tip Growth																												
Cavity																												
Weak Crotch																												
Hollow Trunk																												
Trunk Exudate																												
Regrown Sprouts																												
Exfoliating Bark																												
Insect Damage																												
Diseased																												
Mistletoe										X																		
Leaning																												
Excessive Wound																												
Surface Root																												
Fire Scar																												
Safety Hazard																												
Safety Pruning			X																									
Remove Deadwood																B	B	B	B	A	B	B	B	B	B	B	B	B
Cable/Brace																B	B	B	B	B	B	B	C	C	C	C	C	C
Vigor	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B
Health	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B
Aesthetics	A	B	B	A	A	A	B	B	D	C	C	C	C	C	C	B	C	D	C	A	B	B	C	B	B	C	D	
Balance	B	B	C	A	A	B	B	D	C	C	C	C	C	C	C	B	C	D	C	B	B	C	B	B	C	D	C	
Removal	X							X	X							X	X	X	X	X	X	X	X	X	X	X	X	X
Encroached																												
200 feet from		X	X	X	X	X				X	X	X	X	X	X													
Greater than																												

Appendix B. Oak Tree Survey Data

Tree Number	2631	2632	2633	2634	2635	2636	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2657	2658	2662	2663
Species																												
<i>Canyon Live Oak</i>																												
<i>Valley Oak</i>																												
<i>Scrub Oak</i>													X	X	X	X	X		X		X	X	X	X	X			
<i>Black Oak</i>																												
<i>Interior Live Oak</i>	X	X	X	X	X	X	X	X	X	X	X	X							X		X					X	X	X
<i>Black Oak</i>																										X	X	X
Heritage Oak																												
Trunk Diameter	11	13,12	7,6,5,5,4	19	16	10,10,4	7,7,6,4	10,8,7	7,6,5,4,4,4,4	8,6	11,10	10,10,8,8,8,6	13	44	16,15,15,11	28	27	11,9,9,8	12,10,4	11,8,7	11,10	14	26	25,23	24	11	9	8
Tree Height	36	25	19	42	27	29	20	17	22	22	32	32	34	50	48	51	53	26	28	21	38	45	45	52	42	21	28	32
Canopy North	10	17	14	27	15	16	14	10	12	6	15	10	5	28	22	25	30	12	16	16	22	20	26	26	25	12	10	11
Canopy West	12	20	16	22	6	10	8	12	13	8	17	14	5	28	15	29	26	15	12	5	15	19	20	28	14	12	4	3
Canopy South	10	20	17	21	16	18	12	13	19	12	18	19	20	27	27	30	31	16	13	18	20	26	25	26	16	3	12	3
Canopy East	12	18	3	22	18	17	17	12	17	8	11	21	23	12	28	31	34	16	16	15	15	14	17	27	17	11	7	5
Tree Decline							X	X		X																		
Broken/Dead																										X	X	X
Sparse Foliage		X			X	X	X	X	X	X																		
Excessive Canopy		X				X		X																		X	X	X
Mainstem Damage							X	X		X																X	X	X
Poor tip Growth					X	X	X			X																X	X	X
Cavity							X																				X	X
Weak Crotch												X																
Hollow Trunk																												
Trunk Exudate																												
Regrown Sprouts																												
Exfoliating Bark																												
Insect Damage																										X		
Diseased																												
Mistletoe				X																						X	X	X
Leaning													X													X	X	X
Excessive Wood																												
Surface Root																												
Fire Scar																												
Safety Hazard								X		X																		
Safety Pruning								X		X																		
Remove Deadwood																												
Cable/Brace						X	X	X	X	X		X																
Vigor	B	C	B	B	C	C	C	D	C	D	B	C	B	A	A	A	A	B	A	B	A	A	A	A	A	E	E	D
Health	B	C	A	B	B	C	C	C	B	C	B	B	B	A	A	A	A	B	A	B	A	A	A	A	A	E	E	D
Aesthetics	B	C	B	B	C	C	D	D	C	D	A	C	C	B	A	A	A	C	A	C	B	B	A	A	A	E	E	D
Balance	B	C	C	B	D	C	C	D	C	D	B	B	D	B	A	A	B	B	A	B	B	B	B	A	A	E	E	C
Removal																												
Encroached															X	X	X							X				
200 feet from	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X	X	X
Greater than																												

Appendix B. Oak Tree Survey Data

	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2685	2686	2687	2688	2689	2690	2691	2692	2693	
Tree Characteristics																														
Species																														
Canyon Live Oak																														
Valley Oak																														
Scrub Oak																														
Black Oak																														
Interior Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Black Oak																														
Heritage Oak																														
Trunk Diameter	6,6	7,5	8,5	8,7,6,5,5,4	8	9,8,5	7,6,6	9,4	7,6	8,8,8	8	8	7,5,3	9,8,7	8	8,7	7,4	7,6	10,6,5,5	12,6	10	20,12,11,11,11	9,9,8	9,8	9	0	8,8,6	8,6,6,3	9,7	
Tree Height	26	31	30	29	30	26	20	22	17	33	27	26	31	28	25	27	21	20	27	19	17	21	26	14	23	1	22	18	17	
Canopy North	10	3	16	12	12	15	12	10	7	18	4	5	12	8	16	17	16	2	12	16	8	18	12	10	3	0	10	14	9	
Canopy West	16	13	6	16	13	8	12	14	13	14	3	12	16	7	4	15	17	4	15	5	7	17	14	11	0	0	10	12	9	
Canopy South	15	4	4	10	4	17	10	14	17	16	12	15	6	18	3	6	4	19	14	12	8	17	13	12	0	0	12	10	8	
Canopy East	6	4	14	12	4	5	14	6	12	16	18	16	12	6	15	4	8	10	12	15	8	18	12	10	0	0	12	15	10	
Tree Decline		X	X	X	X	X				X	X	X								X		X	X	X	X					
Broken/Dead			X			X														X		X	X	X	X				X	
Sparse Foliage			X	X	X	X				X	X	X			X				X	X	X	X	X	X	X					
Excessive Canopy		X	X	X	X	X				X	X	X							X		X	X	X	X	X					
Mainstem Damage			X	X	X	X				X	X	X							X		X	X	X	X	X					
Poor tip Growth		X	X	X	X	X				X	X	X			X	X				X		X	X	X	X					
Cavity						X																X								
Weak Crotch																						X								
Hollow Trunk																														
Trunk Exudate																														
Regrown Sprouts											X									X		X		X	X					
Exfoliating Bark			X	X		X																X		X	X					
Insect Damage																						X	X	X	X			X	X	
Diseased		X	X	X	X	X	X	X	X	X	X	X	X			X				X	X	X	X	X	X	X		X	X	X
Mistletoe		X	X	X	X	X	X	X		X	X	X	X	X	X	X				X	X	X	X	X	X		X	X	X	
Leaning			X							X	X				X	X						X								
Excessive Weeds																														
Surface Rooting																														
Fire Scar					X						X	X								X		X	X	X	X					
Safety Hazard					X						X	X								X		X	X	X						
Safety Pruning			X			X	X				X	X								X		X			X					
Remove Deadwood			X			X	X				X									X		X			X					
Cable/Brace			X			X				X										X		X			X					
Measures																														
Vigor	B	D	E	D	D	E	C	C	B	D	E	E	D	C	C	C	C	C	B	D	D	E	E	E	E	F	B	D	C	
Health	B	D	E	E	D	E	D	D	C	E	E	D	D	C	C	C	C	C	C	B	D	D	E	E	E	E	F	B	C	D
Aesthetics	B	D	E	E	D	E	C	D	C	E	E	E	D	C	C	C	C	C	C	D	D	E	E	E	E	F	B	B	B	
Balance	C	C	E	D	D	E	C	C	B	C	E	D	C	D	D	D	C	D	B	D	D	E	E	E	E	F				
Impact																														
Removal																														
Encroached																														
200 feet from	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Greater than																														

Appendix B. Oak Tree Survey Data

Tree Number	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2708	2709	2709	2710	2711	2712	2713	2714	2716	2717	2719	
Species																											
Canyon Live Oak																											
Valley Oak																											
Scrub Oak																											
Black Oak																											
Interior Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Black Oak																											
Heritage Oak																											
Trunk Diameter	9	14	10,9	8,6	9,7	9	10	8	9,6	10	10,6	9,3	7,5,6,5,5,4,4	8,7	7	7,5,6,6,5	9,8	7,5,7,5	10,5,6,5,5,5,3	11,8,7,6	12,9,7,6,6,5,5	6,5,4	11,11,7,4	7,5,7,5,5,5,3	8,4,3,3	8,7,4,4,4,3,3	
Tree Height	18	24	26	23	24	19	24	22	24	1	27	16	16	23	17	10	17	20	21	27	27	26	25	25	18	20	
Canopy North	7	10	15	17	14	14	11	8	4	0	13	8	10	8	5	3	5	10	7	12	13	15	18	25	13	7	
Canopy West	8	10	12	15	16	8	9	12	12	0	16	12	9	4	4	2	7	6	11	16	17	5	16	5	11	15	
Canopy South	8	11	15	4	12	1	7	10	12	0	5	10	10	10	5	13	10	11	12	18	19	5	10	16	12	15	
Canopy East	9	8	17	4	15	10	11	5	7	0	4	10	10	12	2	12	11	9	12	6	20	15	12	17	8	12	
Tree Decline		X	X	X					X			X	X	X	X	X	X	X									
Broken/Dead		X											X	X	X	X	X	X									
Sparse Foliage	X	X	X	X			X	X	X			X	X	X	X	X	X	X									
Excessive Canopy	X	X	X	X					X				X	X	X	X	X	X									
Mainstem Damage		X	X	X					X				X		X	X	X	X									
Poor tip Growth		X	X	X					X			X	X		X	X	X	X									
Cavity		X										X	X		X	X	X	X									
Weak Crotch																											
Hollow Trunk																											
Trunk Exposed																											
Regrown Stem																											
Exfoliating Bark																											
Insect Damage																											
Diseased	X	X	X	X					X				X		X	X	X	X									
Mistletoe	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X						
Leaning				X									X	X	X	X	X	X	X	X	X						
Excessive Wind																											
Surface Root																											
Fire Scar																											
Safety Hazard		X	X	X																							
Safety Pruned		X	X	X										X	X		X										
Remove Deadwood														X	X		X										
Cable/Brace			X	X										X	X		X						X				
Vigor	D	E	E	D	B	B	C	C	D	F	B	D	D	D	D	D	E	C	C	X	X						
Health	D	E	D	D	C	C	D	C	D	F	B	D	D	D	D	D	E	C	C	B	B	C	C	C	C	B	
Aesthetics	D	E	D	D	C	C	D	D	D	F	B	D	D	D	D	D	E	C	C	C	C	C	C	C	C	B	
Balance	C	E	E	D	C	C	C	C	C	F	D	C	D	D	D	D	E	C	B	C	C	D	C	C	C	C	
Removal																											
Encroached																											
200 feet from	X	X	X	X	X	X	X	X	X	DEAD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Greater than																											

Appendix B. Oak Tree Survey Data

Tree Number	2720	2721	2722	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2735	2736	2737	2739	2740	2741	2742	2743	2744	2745	2745	2746	2747
Species										X	X										X	X				
Canyon Live Oak																										
Valley Oak																										
Scrub Oak																										
Black Oak																										
Interior Live Oak	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X			X	X	X	X	X
Black Oak																										
Heritage Oak																										
Trunk Diameter	10,8,7,6,4,2,2	10,9,6	17	11	8,7,6,6,5,5,5	8,6,6	7,6,5,4,2	8,7,5,5,4,4	7,6,5,5,3	12,10	14,13,9	11,11	7,5	9	12	10,9,5	10,9,5	7,6,6,5,4	13,9,9,7,6,6,5	13	20,18	7,5	6,6,5,4	11,7,5,4	8,8,5,5	9,7,7,7
Tree Height	23	22	20	28	25	24	18	22	24	33	34	31	13	16	21	23	19	15	22	30	35	15	22	23	23	22
Canopy North	16	17	17	18	4	12	16	14	17	20	22	17	9	6	9	10	6	10	12	15	18	14	12	15	11	14
Canopy West	14	17	15	14	8	8	5	16	16	19	16	16	11	6	12	5	2	9	15	8	15	3	12	14	10	13
Canopy South	17	16	17	5	16	14	1	12	3	17	5	9	7	6	10	7	17	8	13	6	19	4	12	12	6	10
Canopy East	17	18	10	16	12	17	14	7	3	10	23	19	9	5	10	14	16	10	10	15	19	9	12	16	12	14
Tree Decline					X	X		X	X				X				X	X		X						
Broken/Dead													X					X	X			X				
Sparse Foliage	X	X			X	X	X	X	X				X					X	X							
Excessive Canopy					X	X	X	X					X						X	X						
Mainstem Damage													X						X	X						
Poor tip Growth												X	X						X	X						
Cavity		X				X	X	X												X						
Weak Crotch																										
Hollow Trunk																										
Trunk Exudate																										
Regrown Stems																				X						
Exfoliating Bark																										
Insect Damage						X							X						X	X			X			
Diseased					X	X	X	X	X				X	X	X	X	X	X	X	X			X			X
Mistletoe					X	X	X	X	X			X														X
Leaning									X																	
Excessive Wound																										
Surface Root																										
Fire Scar					X	X	X	X	X											X						
Safety Hazard					X	X	X	X	X											X						
Safety Pruning																										
Remove Deadwood																										
Cable/Brace					X	X	X	X	X			X	X			X	X		X							
Vigor	C	C	C	B	C	E	C	C	C	B	B	C	D	C	B	C	C	C	C	D	B	B	C	A	A	A
Health	C	C	C	B	D	E	C	D	D	B	B	C	D	B	B	C	C	C	D	D	B	A	D	A	A	A
Aesthetics	C	D	C	C	D	E	D	C	D	B	B	C	D	B	B	C	C	C	D	D	C	B	C	A	A	C
Balance	B	B	B	D	D	E	C	D	D	B	B	D	D	C	C	D	D	C	D	X						
Removal																					X					
Encroached																						X				
200 feet from	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X
Greater than																										

Appendix B. Oak Tree Survey Data

Tree Number	2748	2749	2750	2751	2752	2753	2754	2755	2758	2759	2760	2761	2762	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773
Species																							
Canvon Liv	X	X	X	X	X	X	X																
Valley Oak								X	X														
Scrub Oak																							
Black Oak																							
Interior Liv										X	X	X	X	X	X	X	X	X	X	X	X	X	X
Black Oak																							
Heritage Oak								X															
Trunk Diam	9,9,8,8,7,7,6	9,8,7,6,5,5,4	9,8,7,6,6	6,6,5	8,8,7,7,7,6	7,7,7,6,5,5,4	7,7,7,7,6,6,5	53	27,26,13	12,11,10,8,6	10,8,7,7,6	9,9	7,7,6,5,5,4,3	9,9,7,7,7	12,7,6	13,13,6	9	9	11,9,7,5	10,10,10,9	10	10,9,8	12,11
Tree Height	24	22	23	25	20	21	20	55	47	27	22	17	20	26	28	22	28	28	27	30	25	25	24
Canopy Nor	17	17	17	15	16	16	12	30	30	20	17	7	0	17	18	7	10	15	8	17	18	18	25
Canopy We	16	0	8	8	7	10	18	25	10	10	18	9	0	15	16	15	10	10	14	2	8	16	15
Canopy Sou	12	6	5	4	5	17	20	25	28	10	12	1	0	10	17	21	4	6	20	18	1	3	3
Canopy East	10	10	15	10	17	18	10	30	29	17	10	3	0	14	16	16	6	6	12	22	12	19	10
Tree Declin												X											
Broken/Dead												X											
Sparse Foliage												X											
Excessive C												X											
Mainstem D												X											
Poor tip Gr												X											
Cavity																							
Weak Crotch																							
Hollow Trunk																							
Trunk Exud																							
Regrown Stem																							
Exfoliating												X											
Insect Damage																							
Diseased												X											
Mistletoe											X	X						X	X	X	X		
Leaning			X	X	X				X										X	X	X	X	
Excessive W																			X	X	X	X	X
Surface Root																							
Fire Scar																							
Safety Hazard																							
Safety Pruned												X											
Remove Dead												X											
Cable/Brace																							
Vigor	A	A	A	A	A	A	A	A	A	C	B	E	F	A	A	A	C	B	C	B	A	A	A
Health	A	A	B	B	B	A	A	A	B	B	B	E	F	A	A	A	C	C	C	B	B	A	A
Aesthetics	A	B	C	C	B	B	B	A	B	C	B	D	F	A	A	A	D	C	D	B	B	B	B
Balance	A	C	D	D	D	B	B	A	C	C	B	D	F	B	A	B	D	C	D	D	D	C	D
Removal									X	X	X	X	DEAD										
Encroached															X	X							
200 feet from	X	X	X	X	X	X	X	X						X			X	X	X	X	X	X	X
Greater than																							

Appendix B. Oak Tree Survey Data

Tree Number	2774	2776	2777	2778	2780	2781	2782	2783	2784	2786	2787	2788	2789	2790	2791	2792	2793	2794	2796	2797	2798		
Species																							
Canyon Live																							
Valley Oak																x	x	x	x				
Scrub Oak		x																					
Black Oak																							
Interior Live	x		x	x	x	x	x	x	x	x	x	x	x	x						x	x	x	
Black Oak																							
Heritage Oak																							
Trunk Diameter	7,7,6,6,6,5,5	9,6	9	9,5,4,4,4	7,7,7,6,5,5,4	8,7	8	8,8,8	9,8,8,7,6,6,5	8,5	9,9	12,7,5,5,4	12,12,7	9,2	8	8,6	9,8,7	8,7	8	7	7,6,6		
Tree Height	22	8	24	24	20	16	18	22	25	20	23	26	29	25	18	23	25	17	25	26	23		
Canopy North	8	2	12	8	11	16	13	14	10	13	16	12	17	15	25	14	17	10	6	5	8		
Canopy West	8	4	10	11	16	5	4	10	16	10	11	12	15	10	10	10	12	0	12	13	15		
Canopy South	15	2	9	12	12	7	2	7	15	7	7	10	11	4	0	3	9	13	10	4	10		
Canopy East	12	6	4	14	7	15	6	12	10	7	10	14	16	10	5	7	18	14	4	6	7		
Tree Decline		x								x	x		x							x	x		
Broken/Dead							x						x							x	x		
Sparse Foliage							x	x		x	x		x							x	x		
Excessive Canopy		x			x		x	x	x	x	x	x	x							x	x		
Mainstem Damage																				x	x		
Poor tip Growth																							
Cavity																							
Weak Crotch																							
Hollow Trunk																							
Trunk Exudate																							
Regrown Stem																							
Exfoliating Bark																							
Insect Damage											x									x	x		
Diseased									x	x	x									x	x		
Mistletoe		x	x											x	x			x	x	x	x		
Leaning		x				x									x								
Excessive Wind Damage																							
Surface Root																							
Fire Scar																				x	x		
Safety Hazard																				x			
Safety Pruning																							
Remove Deadwood							x								x								
Cable/Brace																							
Vigor	B	D	C	C	C	C	D	C	C	D	D	C	D	B	B	B	B	B	B	D	E	B	
Health	B	D	C	C	C	C	D	C	C	D	D	C	D	B	B	B	B	B	B	E	E	B	
Aesthetics	B	D	D	C	C	C	D	C	C	D	D	C	C	C	D	B	C	B	C	E	E	C	
Balance	B	D	D	D	C	D	D	D	C	D	D	C	C	D	D	C	B	D	D	D	D	C	
Removal																							
Encroached																							
200 feet from	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Greater than																							

Appendix B. Oak Tree Survey Data

Tree Number	2799	2800	2801	2802	2803	2804	2805	2806	2807	2810	2811	2812	2813	2814	2815	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	i	
Tree Characteristics																																	
Species																																	
<i>Canyon Live Oak</i>																																	
<i>Valley Oak</i>																																	
<i>Scrub Oak</i>																																	
<i>Black Oak Hybrid</i>																																	
<i>Interior Live Oak</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
<i>Black Oak</i>																																	
Heritage Oak																																	
Trunk Diameter	22	9	9	7.6.6	8	10.9.9, 9.8.6.4	11.4.3	9.6.3	6.6	7	7.5	12	5.5.5.5	8	10	6.5	5.5.5.4	5	12	12.5	9.7.5.6, 4.4.3	5.5.4	1.1	7.4.5	7	8	8.4.2.5	13.9.5, 5.4.5	6.6.4.5	4.4	8.5.6.6, 6.5.5	9.4	8.5.6.6, 3
Tree Height	34	1	1	1	1	17	29	29	30	8	18	17	19	20	19	20	12	20	22	17	16	16	23	26	27	25	25	20	21	21	22		
Canopy North	18	0	0	0	0	7	5	5	6	1	4	2	11	1	1	16	5	12	7	11	5	11	11	5	10	8	11	7	13	19	8		
Canopy West	21	0	0	0	0	16	4	6	5	1	6	4	5	7	9	8	5	14	12	12	5	6	1	7	9	5	7	8	11	16	18		
Canopy South	17	0	0	0	0	16	17	12	6	1	7	6	6	13	15	3	6	9	15	12	6	8	4	10	4	4	14	10	12	3	19		
Canopy East	17	0	0	0	0	10	12	12	10	1	4	2	11	9	11	4	6	16	13	10	3	9	15	12	2	8	16	5	9	7	11		
Physical Condition																																	
Tree Declining										X	X		X	X	X	X						X	X				X	X					
Broken/Dead Limbs										X							X					X	X				X	X					
Sparse Foliage										X		X	X				X					X	X										
Excessive Chlorosis/Necrosis										X		X					X					X	X				X	X	X		X	X	
Mainstem Dieback										X		X					X					X	X										
Poor tip Growth										X		X					X					X	X										
Cavity										X	X						X						X						X				
Weak Crotch																																	
Hollow Trunk																																	
Trunk Exudation																																	
Regrown Stump																																	
Exfoliating Bark																																	
Insect Damage								X								X																	
Diseased										X		X					X					X	X										
Mistletoe										X	X	X	X	X	X	X	X					X	X				X	X					
Leaning														X	X								X	X	X			X	X				
Excessive Water Shoots																										X							
Surface Roots																																	
Fire Scar																																	
Safety Hazard										X	X																						
Safety Prune										X	X						X					X	X										
Remove Deadwood										X	X						X					X	X										
Cable/Brace											X		X	X	X	X						X	X										
Rating																																	
Vigor	C	F	F	F	F	B	B	B	C	D	C	E	C	C	C	C	E	B	B	B	C	E	C	C	B	C	C	D	C	C	C		
Health	B	F	F	F	F	B	B	C	B	D	C	D	C	C	C	C	E	B	B	B	D	E	C	C	C	D	D	D	C	C	C		
Aesthetics	B	F	F	F	F	C	C	C	C	E	C	E	D	C	C	C	E	B	B	B	D	E	D	C	C	D	D	D	C	C	C	C	
Balance	B	F	F	F	F	C	C	C	C	D	B	E	D	D	D	D	E	C	B	B	C	D	D	B	D	C	C	C	C	C	C		
Impact																																	
Removal																																	
Encroached																																	
200ft from Grading	X	DEAD	DEAD	DEAD	DEAD	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X						
Greater than 200ft																		X	X	X	X	X						X	X	X	X	X	

Appendix B. Oak Tree Survey Data

	2837	2838	2839	2839	2840	2841	2842	2843	2844	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870				
Tree Characteristics																																						
Species																																						
<i>Canon Live</i>																											X	X										
<i>Valley Oak</i>							X	X	X																													
<i>Scrub Oak</i>																																						
<i>Black Oak I</i>																																						
<i>Interior Liv</i>	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X			
<i>Black Oak</i>																											X											
Heritage Oak																																						
Trunk Diam	12	7	8.7	6.5,5.5,5.5	6.5,5.5,8		3021.1,2.9	18	6.5,5	7.5	9.9,8.6	8	8	9.8,5.7,7.7,6	6.6,5	8.4,5.3	10.8,6.4	10.10,8.7,5	22	8.7	9.6,5	8.4,4.4	8.6,5.5,4.4	7.4	7.5	49	10	7.5,5	5.5,5.4	7.5,4	6	6.5,5.4,1.5	7.6,5.4,5.4	6.4,5.4,4				
Tree Height	23	20	22	20	22	22	44	38	18	22	23	21	19	24	20	22	24	23	20	20	21	20	20	15	17	38	23	17	25	16	18	20	20	18				
Canopy Nort	15	6	5	15	6	4	21	23	10	12	14	8	10	16	12	12	6	11	12	9	16	6	11	13	14	12	8	1	16	0	0	0	8	8				
Canopy West	16	3	8	8	13	11	19	18	7	2	12	2	10	10	6	10	5	11	12	9	16	6	11	13	14	12	8	1	16	0	0	0	10	12				
Canopy Sout	6	8	16	4	17	12	29	15	8	10	13	7	5	15	5	6	13	15	10	10	14	5	13	5	4	8	13	8	12	0	0	0	10	12				
Canopy East	4	10	11	7	8	5	27	17	6	12	11	8	3	17	8	8	14	14	4	8	8	14	12	2	2	32	15	15	7	0	0	0	12	11				
Physical Condition																																						
Tree Declini																																				X		
Broken/Dead	X																																			X		
Sparse Folia	X		X	X	X	X																															X	
Excessive Cl	X		X			X																																
Mainstem Di																																						
Poor tip Gro			X																																			
Cavity			X																																			
Weak Crotch																																						
Hollow Trun																																						
Trunk Exud																																						
Regrown Stu																																						
Exfoliating B																																						
Insect Dama																																						
Diseased																																						
Mistletoe																																						
Leaning			X									X																										
Excessive W																																						
Surface Root																																						
Fire Scar																																						
Safety Hazar			X																																			
Safety Prune			X																																			
Remove Dead	X																																					
Cable/Brace			X		X																																	
Rating																																						
Vigor	C	B	C	C	D	C	A	A	A	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	B	B	B	D	C	B	F	F	F	F	B	C		
Health	D	C	D	B	C	C	A	A	A	A	A	A	B	A	A	A	A	A	A	A	B	A	A	A	C	B	B	D	C	B	F	F	F	F	A	C		
Aesthetics	D	B	D	C	C	C	A	A	B	B	A	B	B	A	C	B	A	A	B	A	B	B	A	A	C	C	D	D	C	B	F	F	F	F	B	C		
Balance	D	C	D	C	C	C	A	B	B	C	A	D	C	A	C	B	A	C	C	B	B	B	A	A	D	D	C	D	C	F	F	F	F	B	C			
Impact																																						
Removal																																						
Encroached									X																													
200ft from G	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
Greater than																																						X

Appendix B. Oak Tree Survey Data

	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2886	2887	2888	
Tree Characteristics	Species																			
	Canyon Live																			
	Valley Oak															X				
	Scrub Oak																			
	Black Oak I																		X	
	Interior Live	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		
	Black Oak																			
	Heritage Oak																			
	Trunk Diam	5.5	7.3	5.5	6.4,5.3, 5	8,7.5,7. 5,7	8,7.5,4	6.5,5.5, 4.5,4	7.6,5.6, 5.5,4	8.6,5	8.5,5.5	8.6	8,7.3,5	8.6,5.6, 5	6.5,5.5, 5.5,4	7.7,5	25	9.5,7.5	9	6.5,6
	Tree Height	13	15	17	18	18	18	15	18	20	20	20	22	20	20	25	45	23	17	20
Canopy North	7	5	8	10	2	0	10	12	12	11	11	14	12	9	5	26	7	5	8	
Canopy West	5	4	5	8	10	0	11	12	10	11	6	3	11	12	10	24	15	4	10	
Canopy South	2	7	8	11	11	0	13	11	14	13	13	12	10	12	16	22	8	2	9	
Canopy East	8	7	6	5	3	0	11	7	11	10	11	13	6	4	6	21	9	2	7	
Physical Condition	Tree Declini				X														X	
	Broken/Dead				X														X	
	Sparse Folia				X			X									X		X	
	Excessive Cl				X			X									X		X	
	Mainstem D																		X	
	Poor tip Gro					X											X		X	
	Cavity																			
	Weak Crotch																			
	Hollow Trun																			
	Trunk Exud																			
	Regrown Stu																			
	Exfoliating B					X														X
	Insect Dama																			X
	Diseased					X														
	Mistletoe					X		X												
	Leaning																			
	Excessive W																			
Surface Root																				
Fire Scar																				
Safety Hazar																				
Measure	Safety Prune																			
	Remove Dead					X													X	
	Cable/Brace					X													X	
Rating	Vigor	B	B	B	B	E	F	B	C	C	C	B	B	A	A	A	C	E	C	
	Health	B	B	B	B	E	F	B	D	D	C	C	A	A	A	A	D	E	C	
	Aesthetics	B	B	B	B	D	F	B	C	C	C	C	A	A	B	B	A	D	C	
	Balance	C	B	B	B	D	F	B	D	C	C	C	C	B	C	C	A	D	C	
Impact	Removal															X				
	Encroached																			
	200ft from G Greater than	X	X	X	X	X	DEAD	X	X	X	X						X	X		

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Stamp

Consultant

Key

YOUNG NAK CHRISTIAN CHURCH RETREAT CENTER SCHEMATIC DESIGN LAKE HUGHES, CALIFORNIA

05/25/03 SCHEMATIC REDESIGN SUBMITTED
CONSTITUENCY PRESENTATION
05/07/03 SCHEMATIC REDESIGN SUBMITTED
FOR OWNER REVIEW
07/30/02 SCHEMATIC DESIGN SUBMITTED
FOR OWNER REVIEW
Submitted / Revisions

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Lake Hughes, California

Owner
Young Nak Presbyterian
Church of Los Angeles
1721 N. Broadway
Los Angeles, California
90031

AP Number 3243-017-021

Job Number 229-01

Date 05/07/03

Sheet Title
SCHEMATIC
SITE LIGHTING
PLAN

SA-1.3

AS NOTED

LUMINAIRE LOCATIONS					
No.	Label	Location	MH	Orientation	Tilt
1	A	16.0 16.0	21.4	0.0	
2	A	16.0 16.0	26.2	0.0	
3	C	16.0 16.0	28.1	0.0	
4	C	16.0 16.0	28.1	0.0	
5	A	16.0 16.0	111.6	0.0	
6	A	16.0 16.0	303.4	0.0	
7	A	16.0 16.0	306.6	0.0	
8	A	16.0 16.0	296.3	0.0	
9	A	16.0 16.0	16.7	0.0	
10	A	16.0 16.0	49.2	0.0	
11	A	16.0 16.0	231.7	0.0	
12	A	16.0 16.0	231.7	0.0	
13	A	16.0 16.0	16.7	0.0	
14	A	16.0 16.0	79.9	0.0	
15	A	16.0 16.0	230.1	0.0	
16	B	16.0 16.0	257.7	0.0	
17	B	16.0 16.0	257.7	0.0	
18	A	16.0 16.0	178.8	0.0	
19	A	16.0 16.0	167.0	0.0	
20	A	16.0 16.0	123.0	0.0	
21	A	16.0 16.0	84.2	0.0	
22	A	16.0 16.0	85.6	0.0	
23	A	16.0 16.0	9.0	0.0	
24	B	16.0 16.0	170.3	0.0	
25	B	16.0 16.0	170.3	0.0	
26	B	16.0 16.0	170.3	0.0	
27	B	16.0 16.0	-4.9	0.0	
28	B	16.0 16.0	-4.9	0.0	
29	B	16.0 16.0	-4.9	0.0	
30	D	16.0 16.0	296.4	0.0	
31	B	16.0 16.0	88.6	0.0	
32	A	16.0 16.0	0.0	0.0	
33	A	16.0 16.0	-2.3	0.0	
34	A	16.0 16.0	64.7	0.0	
35	A	16.0 16.0	77.3	0.0	
36	A	16.0 16.0	196.1	0.0	
37	A	16.0 16.0	-79.0	0.0	
38	A	16.0 16.0	254.3	0.0	
39	A	16.0 16.0	18.4	0.0	
40	A	16.0 16.0	18.1	0.0	
41	A	16.0 16.0	34.8	0.0	
42	A	16.0 16.0	56.9	0.0	
43	A	16.0 16.0	156.7	0.0	
44	A	16.0 16.0	236.4	0.0	
45	A	16.0 16.0	139.7	0.0	
46	A	16.0 16.0	191.5	0.0	
47	A	16.0 16.0	0.0	0.0	
48	A	16.0 16.0	20.7	0.0	
49	A	16.0 16.0	-87.0	0.0	
50	A	16.0 16.0	23.4	0.0	
51	A	16.0 16.0	178.4	0.0	
52	A	16.0 16.0	-2.3	0.0	
53	A	16.0 16.0	82.4	0.0	

Note: Site Lighting values provided by MarVista Lighting

Plant Communities

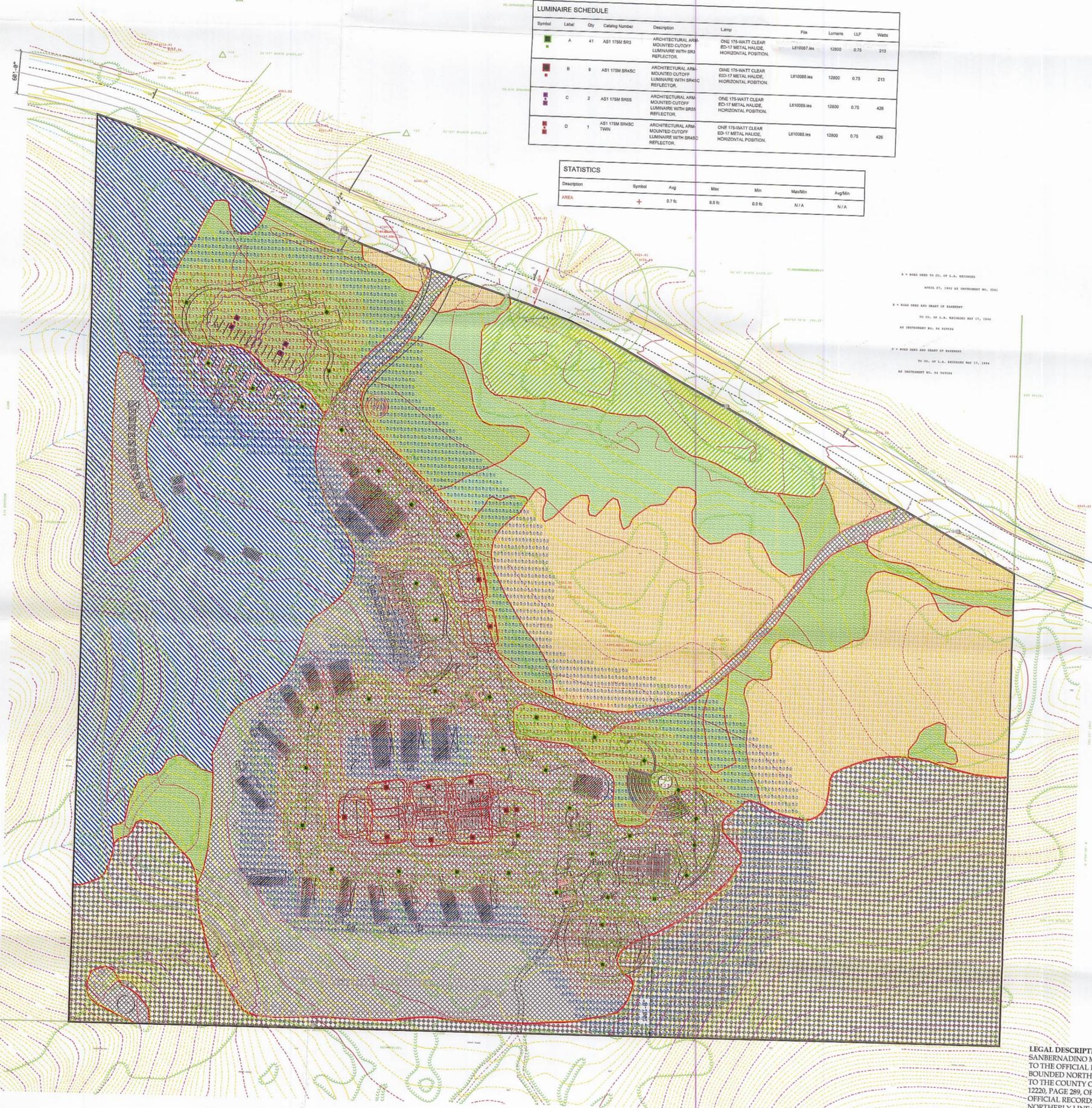
- Developed-Disturbed
- Mixed Grassland
- Pine Forest
- Pine Oak Woodland
- Rush Sedge Woodland
- Scrub Oak Chapparral
- Willow-Oak Woodland
- Willow Riparian Woodland
- Project Boundary

*Please note unmarked areas represent annual grassland / disturbed, mixed grassland and rush sedge areas

Plant communities locations, types and limits have been provided by Impact Sciences

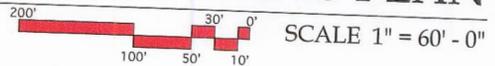
LUMINAIRE SCHEDULE									
Symbol	Label	Qty	Category Number	Description	Lamp	File	Lumens	LF	Watts
	A	41	AS1 175M 583	ARCHITECTURAL ARM MOUNTED CUTOFF LUMINAIRE WITH BRAC REFLECTOR.	ONE 175-WATT CLEAR ED-17 METAL HALIDE, HORIZONTAL POSITION.	LF10087.lvs	12800	0.75	313
	B	9	AS1 175M 584C	ARCHITECTURAL ARM MOUNTED CUTOFF LUMINAIRE WITH BRAC REFLECTOR.	ONE 175-WATT CLEAR ED-17 METAL HALIDE, HORIZONTAL POSITION.	LF10088.lvs	12800	0.75	313
	C	2	AS1 175M 585S	ARCHITECTURAL ARM MOUNTED CUTOFF LUMINAIRE WITH BRAC REFLECTOR.	ONE 175-WATT CLEAR ED-17 METAL HALIDE, HORIZONTAL POSITION.	LF10089.lvs	12800	0.75	428
	D	1	AS1 175M 584C TWN	ARCHITECTURAL ARM MOUNTED CUTOFF LUMINAIRE WITH BRAC REFLECTOR.	ONE 175-WATT CLEAR ED-17 METAL HALIDE, HORIZONTAL POSITION.	LF10088.lvs	12800	0.75	428

STATISTICS						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
AREA	+	0.76	8.6	0.0	N/A	N/A



LEGAL DESCRIPTION: THAT PORTION OF SECTION 10, TOWNSHIP 7 NORTH, RANGE 16 WEST, SANBERNARDINO MERIDIAN, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT OF SAID LAND, FILED IN THE DISTRICT LAND OFFICE ON AUGUST 25, 1903, BOUNDED NORTHERLY BY THE SOUTHERLY LINE OF ELIZABETH LAKE PINE CANYON ROAD, AS GRANTED 12220, PAGE 289, OFFICIAL RECORDS, AND ON MAY 22, 1934, AS INSTRUMENT NO 567, IN BOOK 22816, PAGE 75, OFFICIAL RECORDS OF SAID COUNTY, EASTERLY BY THE EAST LINE OF SAID SECTION 10, SOUTHERLY BY THE NORTHERLY LINE OF GOVERNMENT LOT 7 OF SAID SECTION AND WESTERLY BY THE EASTERLY LINE OF GOVERNMENT LOT 6 OF SAID SECTION.

YOUNG NAK RETREAT CENTER- SCHEMATIC SITE LIGHTING PLAN

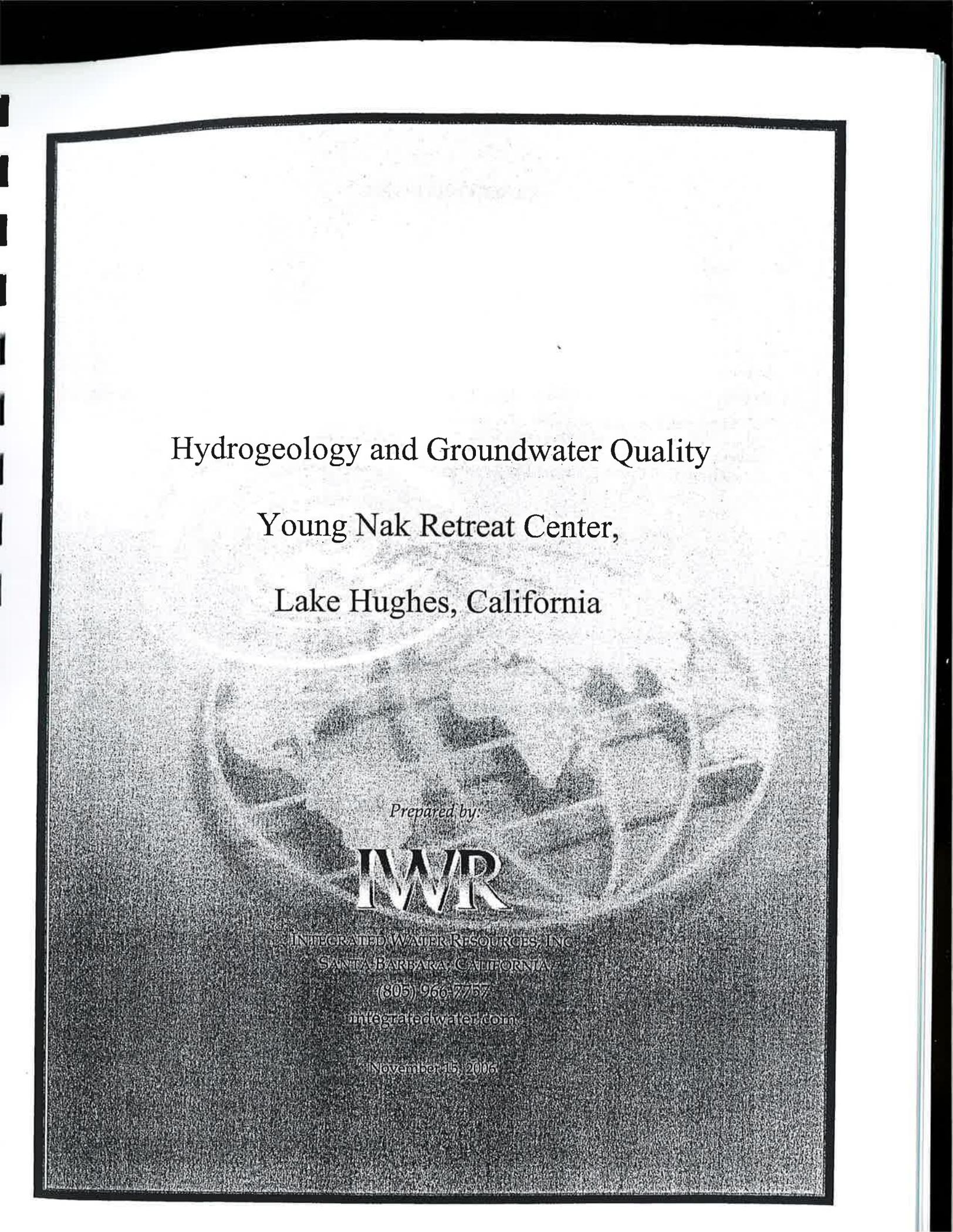


SITE PLAN, SURVEY INFORMATION AND TOPOGRAPHY PROVIDED BY HOVELL & PILARSKI ENGINEERING, INC. 4525 INDUSTRIAL STREET, SUITE 4-L PO BOX 479, SIMI VALLEY CALIFORNIA 93062



APPENDIX F

Hydrology and Groundwater Quality



Hydrogeology and Groundwater Quality

Young Nak Retreat Center,

Lake Hughes, California

Prepared by:

IWR

INTEGRATED WATER RESOURCES, INC.

SANTA BARBARA, CALIFORNIA

(805) 966-7757

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November 15, 2006

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INTRODUCTION

This report summarizes hydrogeologic conditions, and estimates changes to groundwater quality and quantity that would be caused by proposed site improvements at the Young Nak Christian Retreat Center ("Center") in Lake Hughes, California. Proposed improvements at the Center are expected to accommodate as many as 300 summer weekend visitors.

Based upon the analysis provided herein, no significant impacts to groundwater, water quality or the riparian wetland habitat are anticipated.

EXISTING CONDITIONS

Groundwater Hydrology

The Center is located at 24100 Pine Canyon Road near Lake Hughes, California (Figure 1). The single most important geologic feature at the site is the San Andreas Fault, which runs along the northeast edge of the property from the southeast to the northwest. The combination of the fault on the northeast and the mountains to the southwest creates unique hydrogeologic conditions at the site. Relatively larger quantities of precipitation at higher elevations in the mountains recharge the regional groundwater aquifer. Groundwater gradients are from higher elevations to lower, but the San Andreas Fault acts as a relatively impermeable barrier to groundwater flow. At the Center property this results in groundwater gradients that likely flow from the southwest to the northeast, and results in relatively shallow groundwater on the up-gradient side of the San Andreas Fault as flow is hindered.

Potable water is supplied by a groundwater well that was present when the property was purchased. The well is 110 feet deep. Information on subsurface lithology at the site is limited, because of the lack of a state well driller's report and lithologic log for the well on the property. Percolation tests conducted by Professional Geotechnical Consultants, Inc. in February of 2006 provide additional information on soil and shallow alluvial sediment properties, to depths of approximately 15-20 feet below ground surface.

Integrated Water Resources, Inc. ("IWR") conducted a pumping test of the groundwater production well at the Young Nak Center on April 20, 2006. The purpose of the pumping test was to obtain data on aquifer properties, in order to estimate the effect of longer term sustained pumping rates required to provide water supply for the planned expanded facilities at the Center. This 4.8 hour pumping test averaged 17 gallons per minute (gpm), and represents the maximum

sustainable rate of the pump (see Figure 2 and Table 1 for test data). Total drawdown in the well at the end of the test was 3.1 feet. This drawdown level had not changed for the last 1.5 hours of the test.

A water sample for water quality analysis was collected near the end of the pumping test. This sample was collected at the well-head and upstream of the chlorination and filtration system. The results of this analysis are provided below in the Groundwater Quality section of this report.

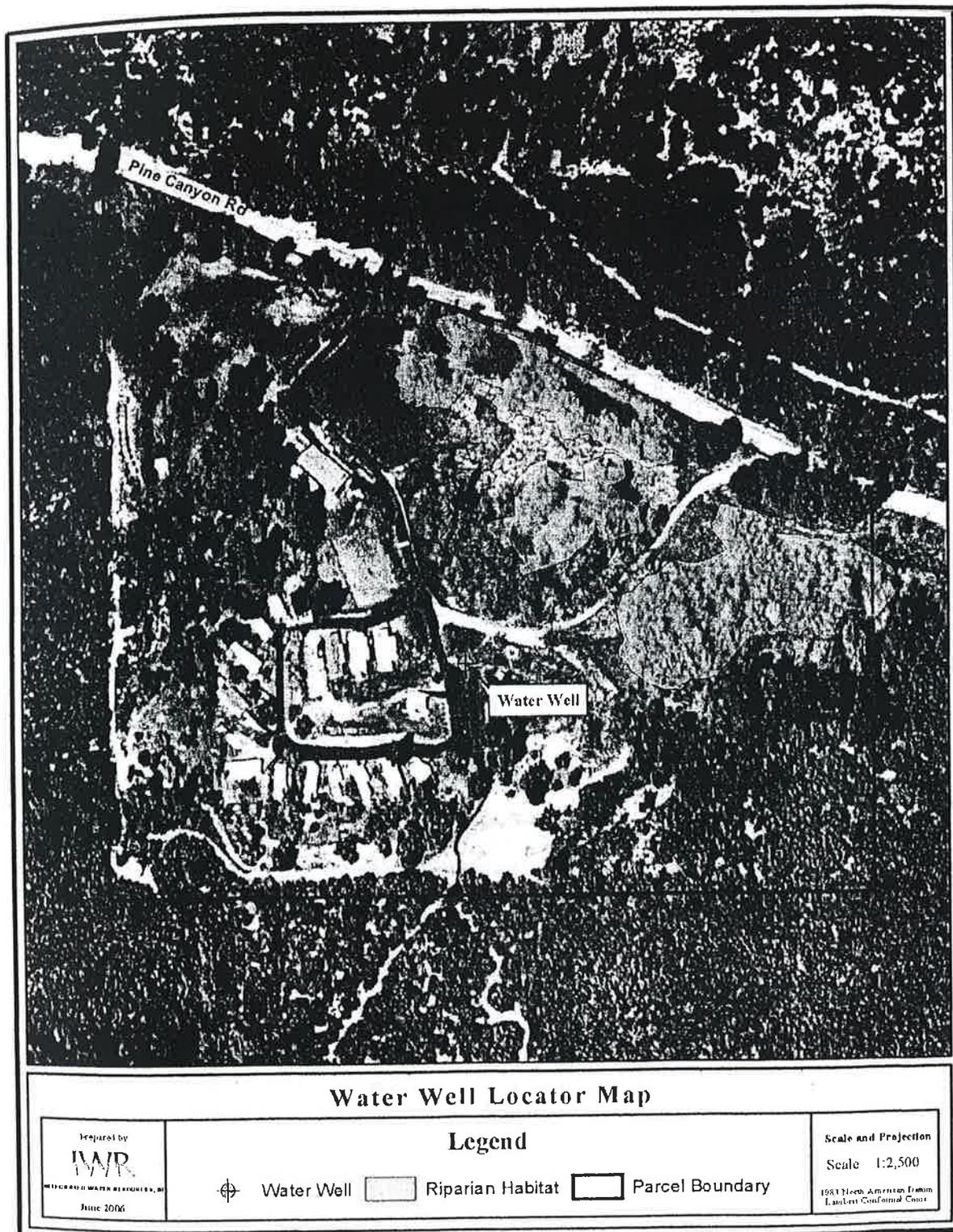


Figure 1. Map of Young Nak Retreat Center illustrating property boundary, riparian habitat and location of water supply well.

Table 1. Pumping Test Data – Young Nak Center, Lake Hughes, CA – April 20, 2006

Elapsed Time (minutes)	Depth to Water	Pumping Rate
	(in feet, at top of casing)	(gpm)
0	4	
1	5.2	
2	5.4	31
3	5.5	2
4	5.5	6
5	5.5	6
7	5.5	9
10	4.1	
13	5	
14	5.1	6
15	5.3	
20	5.5	
25	5.6	23
30	5.7	19
35	5.75	19
40	5.8	18
48	5.85	16
50	5.87	28
65	5.9	18
80	5.92	19
95	5.95	19
110	5.98	19
125	6	18
140	6.25	19
155	6.5	19
170	6.7	18
188	6.9	19
200	7.1	15
215	7.1	18
230	7.1	19
245	7.1	18
260	7.1	19
275	7.1	18
290	7.1	13

Pump Test Young Nak Center, Lake Hughes, CA - April 20, 2006

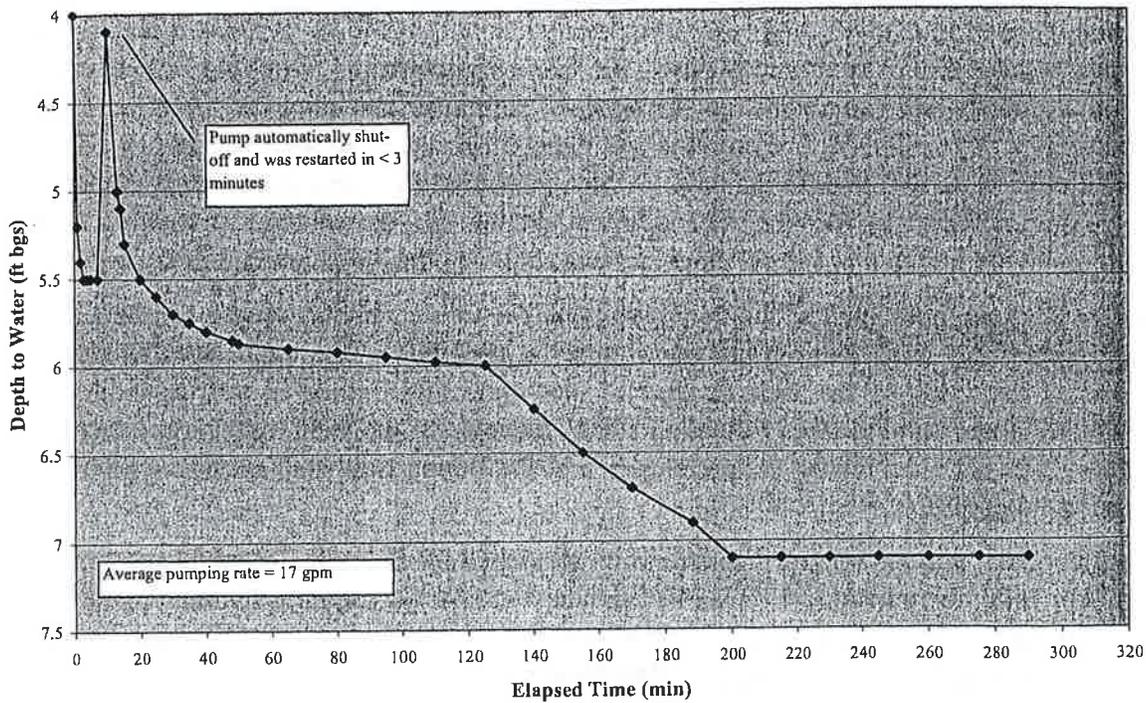


Figure 2. Graph of drawdown vs. elapsed time for pumping test.

Aquifer Characteristics and Analysis

Determination of the local aquifer characteristics is conducted for the purpose of evaluating the magnitude and extent of aquifer drawdown, the "cone of depression", resulting from existing and proposed groundwater extractions. A fundamental parameter that supports this effort is known as the aquifer "transmissivity". The value calculated for this term provides a measure of the ease which groundwater will flow to the well. A high transmissivity corresponds with a greater flow rate of groundwater to the well for a given amount of drawdown. Likewise, a lower transmissivity indicates that a lesser flow rate will result for that same amount of drawdown.

In unconfined aquifers such as the one underlying the Center, transmissivity can be calculated using an empirical relationship based upon "specific capacity" of the well. Specific capacity is defined as the yield of the well divided by the drawdown measured corresponding to the equilibrated water level reached following steady pumping at the well's typical production rate. Based on data collected during the pumping test at the Young Nak well, specific capacity of the aquifer is 5.5 gpm/ft.

Using this data, and an empirical relationship developed by Driscoll [Groundwater and Wells, 1986; app 16D], the transmissivity can be calculated as specific capacity (in units of: gpm per ft of drawdown) x 1500. Based on the specific capacity calculated above, transmissivity for the aquifer is calculated to be approximately 8,000 gpd/ft.

This calculated value is consistent with an independent approach to calculating transmissivity based upon the "Hydraulic Conductivity" (similar to the "permeability") of the aquifer. A typical sandy aquifer has a hydraulic conductivity of approximately 100 gpd/ft². Assuming that the well has 80 feet of perforated casing (110 ft deep minus an approximately 30 ft deep sanitary seal), then the effective aquifer thickness is 80 feet. Using the classic hydrogeologic relationship of transmissivity equating to the aquifer thickness times its hydraulic conductivity yields a transmissivity of approximately 8,000 gpd/ft, consistent with that calculated with the initial method described above.

It is possible that the well yield and aquifer characteristics could be greater or lesser than the conservative assumptions identified above. Minor changes in these values will correspond with inconsequential changes to the drawdown present at large distances (greater than 2,000 ft) from the well. Additionally, because of the groundwater gradient, with higher groundwater elevations in the steep hills south of the well, most of the added drawdown would be in that direction where a relatively small increase in drawdown will correspond with a large increase in groundwater flowing to the well. This difference in the aquifer yield from up-gradient areas compared with down-gradient, lower elevation areas will result in an asymmetrical, oval-shaped cone of depression with a long axis trending southwest-northeast. Importantly, the presence of higher groundwater elevations south of the well will correspond with the majority of the groundwater extracted from the well being derived from those areas, which lessens the actual drawdown associated on the more shallowly sloping areas to the north of the well and nearer to the proposed septic system discharge area.

Riparian wetland habitat is present at the sag ponds associated with the San Andreas Fault located, at its nearest point, approximately 180 feet away and at nearly 40 feet lower elevation from the well site. These sag ponds likely represent a surface exposure of the groundwater table, and therefore, it is important to investigate the relationship of pumping at the Center's well on water levels at these sag ponds. Historical water production (see below) has been a fraction of the pumping capacity of the well, and likely has resulted in no sustained groundwater depression. It is unlikely, even at maximum historical pumping rates, that groundwater pumping has affected water levels associated with the sensitive wetland habitat.

Groundwater Quality

The water quality sample collected near the end of the pumping test provided data indicating that groundwater quality is very good, and is considerably better than drinking water standards as listed by the California Department of Health Services Title 22 regulations. In all cases, the concentrations of various parameters detected in the water sample from the property's water well substantially lower than the corresponding primary or secondary Maximum Contaminant Level (MCL) indicating clear compliance with these regulatory limits.

Table 2. Water Quality Data – Young Nak Retreat Center, Lake Hughes, CA

SAMPLE DATE	ANALYTE	RESULT	DL	PRIMARY MCL	SECONDARY MCL	UNITS
04/20/06	Aluminum	ND	0.5	1000	200	ug/l
04/20/06	Arsenic	0.2	0.1	50		ug/l
04/20/06	Barium	6.4	0.05	1000		ug/l
04/20/06	Bicarbonate Alkalinity	134	0.6			ug/l
04/20/06	Cadmium	ND	0.07	5		mg/l
04/20/06	Calcium	36.2	0.005			ug/l
04/20/06	Carbonate Alkalinity	ND	0.6			mg/l
04/20/06	Chloride	32.2	0.07			mg/l
04/20/06	Chromium	0.7	0.09	50	500	mg/l
04/20/06	Color	9.0	1.0			ug/l
04/20/06	Copper	0.3	0.06			Color Units
04/20/06	Fecal Coliforms	ND	1.0		1000	ug/l
04/20/06	Fluoride	0.59	0.01			MPN/100 ml
04/20/06	Hydroxide Alkalinity	ND	0.6			mg/l
04/20/06	Iron	0.04	0.007			mg/l
04/20/06	Lead	ND	0.07		0.3	mg/l
04/20/06	Magnesium	8.24	0.01		15	ug/l
04/20/06	Manganese	0.7	0.3			mg/l
04/20/06	MBAS	ND	0.05		50	ug/l
04/20/06	Mercury	ND	0.05	2	0.5	mg/l
04/20/06	Nitrate as NO3	0.84	0.02	45		ug/l
04/20/06	Odor	ND	0.1			mg/l
04/20/06	pH	6.4	0.1		3	T.O.N.
04/20/06	Potassium	1.49	0.06			pH Units
04/20/06	Selenium	ND	0.1	50		mg/l
04/20/06	Silver	ND	0.06			ug/l
04/20/06	Sodium	13.8	0.51		100	ug/l
04/20/06	Specific Conductance (EC)	322	0.05			mg/l
04/20/06	Sulfate as SO4	44.8	0.02		900	umhos/cm
04/20/06	Total Alkalinity	134	0.6		500	mg/l
04/20/06	Total Anions	3.4				mg/l
04/20/06	Total Cations	3.1				NA
04/20/06	Total Coliforms	ND	1.0			NA
04/20/06	Total Dissolved Solids	213	0.2			MPN/100 ml
04/20/06	Total Hardness	132	0.8		1000	mg/l
04/20/06	Turbidity	0.9	0.002			mg/l
04/20/06	Zinc	5.1	0.3		5	NTU
					5000	ug/l

*The groundwater quality sample was collected after > 4 hours of continuous well pumping at an average rate of 17 gpm. Samples were collected immediately above the wellhead, upstream of the filtration and chlorination systems. DL=Detection Limit; MCL=Maximum Contaminant Level.

Historical Groundwater Use

The Young Nak water supply well currently provides all water needs for the Center. Records indicate that in 2004 total pumping was 1,004,100 gallons (3.1 acre-feet), and in 2005 total pumping was 1,550,662 gallons (4.8 acre-feet). Over this same two year period winter time average daily consumption ranged from 1 gpm to 2 gpm (1,440-2,880 gpd), and summer average daily consumption ranged from 2.25 gpm to 5 gpm (3,240-7,200 gpd). This range, from winter to summer, directly reflects the number of visitors to the center, with summer weekend retreats representing maximum occupancy and consumption rates. The maximum average summertime pumping rate of 5 gpm is only 30% of the pumping capacity of the existing groundwater pump.

As demonstrated by the sustained pumping test at 17 gpm that produced 3.1 feet of drawdown over 4.8 hours, the existing water supply well has been able to provide potable water for the Center without any long term stress to the aquifer.

ANALYSIS OF PROPOSED CONDITIONS

An analysis of the effects of project implementation is discussed for each of the criteria identified below.

Proposed Changes in Groundwater Consumption

It is anticipated that the annual groundwater pumping after the project improvements are implemented will increase the current average groundwater pumping rate of approximately 4,000 gallons per day (or 4.4 acre-feet per year) to an annual average of 16,000 gallons per day (or 17.4 acre-feet per year). Analytical results of the affect of this increased average annual pumping rate (11 gpm for 1 year) are provided in Figure 3. Total drawdown at the property edge, assuming a circular cone of depression, would be less than 1 foot. This is a conservative analysis because it does not take into account the fact that the wastewater disposal system will be percolating nearly this entire pumped amount back into the aquifer which will tend to diminish the drawdown effect from the well pumping.

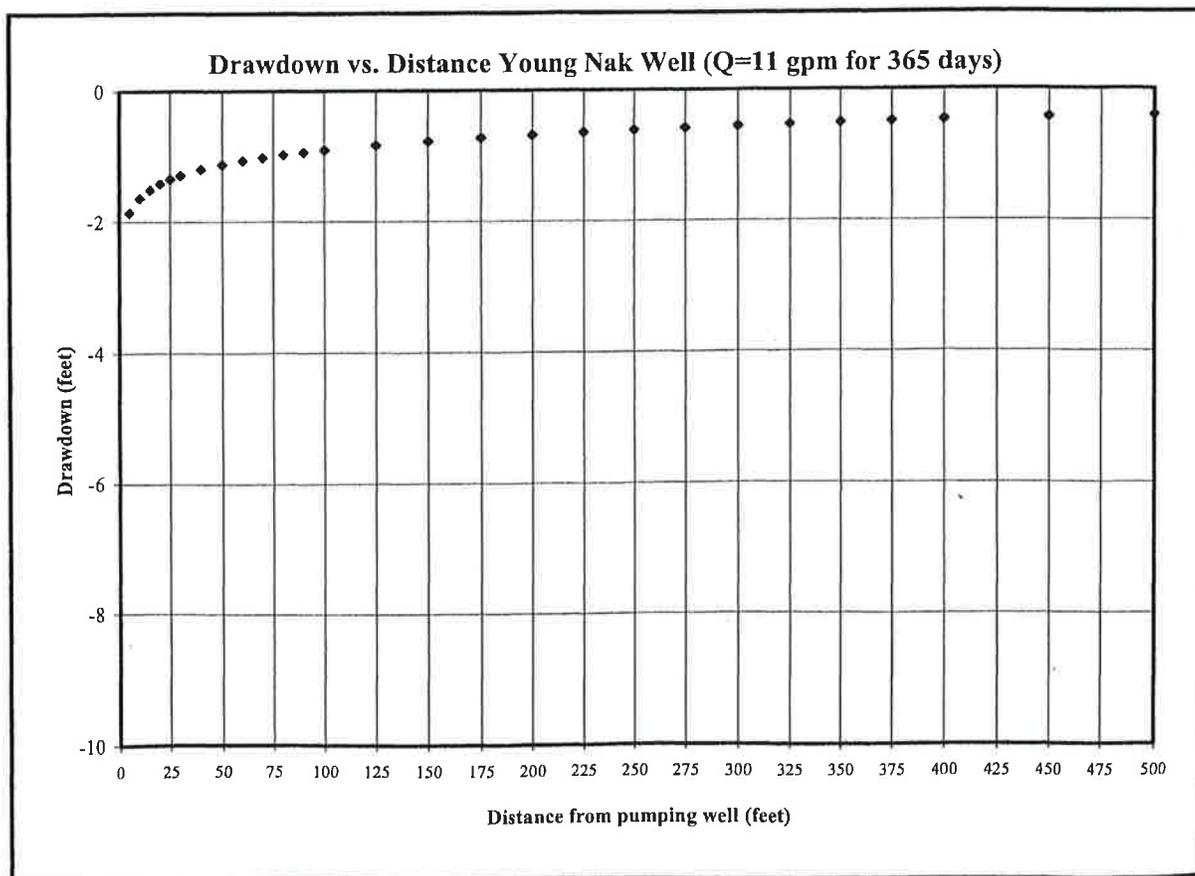


Figure 3. Graph illustrating drawdown for expected average annual pumping rate after Center improvements.

After implementation of the proposed project improvements, it is estimated that as many as 300 people may be at the site during peak summer weekends. The maximum rate of wastewater production, as calculated using industry standards by WREA (See WREA Wastewater Collection and Disposal System report dated October 27, 2006), is 19,500 gallons per day, or 13.5 gpm. This corresponds to the high use summer weekends.

Because the majority of the additional water will be used to support the presence of a larger number of guests at the site through the increased use of water in the kitchens, toilets, and showers, almost all of this additional water will be captured by the septic system and subsequently conveyed back to the aquifer via the leach line systems. Because the water returns to the aquifer, there will be very limited "consumptive use" (i.e., net removal of water from the aquifer). Therefore, the net change in total groundwater at the Center will be negligible.

The maximum wastewater production rate can be considered to represent the likely groundwater supply rate required for the high use summer weekends, or 13.5 gpm. The existing groundwater well is capable of producing, for sustained periods, 17 gpm or 24,500 gallons per day, which provides a 20% additional capability over anticipated peak demand. In addition, the Center may install additional water supply storage to support the high use weekends and reduce demand on the water well. The presence of greater water supply storage will allow for lower, but more sustained, pumping rates over the summer months, which will minimize any affects on groundwater levels.

Utilization of water conservation measures including such measures as the installation of waterless urinals, and low-flow toilets and showerheads and educational measures for visitors, will serve to minimize water supply needs and groundwater extraction at the site.

Proposed Changes in Groundwater Use and Effects on Groundwater Table

As stated above, the majority of the pumped groundwater will be discharged back to the aquifer following conveyance and treatment by the septic system. Therefore, long term changes to the regional groundwater table will be minimal as a result of the proposed increased pumping.

Increased pumping rates associated with the proposed project will create a larger groundwater depression in the vicinity of the water well during the periods (primarily the summer months) corresponding with the increased water demand. Based upon the aquifer characteristics calculated in the "Aquifer Characteristics and Analysis" section of this report, an analysis of the average effect of using a sustained maximum pumping rate (17 gpm) for an extended period (30 days) indicates that total drawdown will be less than 1 foot at a distance of 100 feet from the well, and less than half a foot at the distance of the wetlands (Figure 4). In addition, as stated above, the groundwater depression will likely be considerably asymmetric. This asymmetry is generated from the steep terrain to the south of the well, the source of the majority of the well's groundwater supply, compared to the relatively flat terrain near to and north of the well. This asymmetry will tend to lessen the anticipated drawdown in the riparian wetlands area.

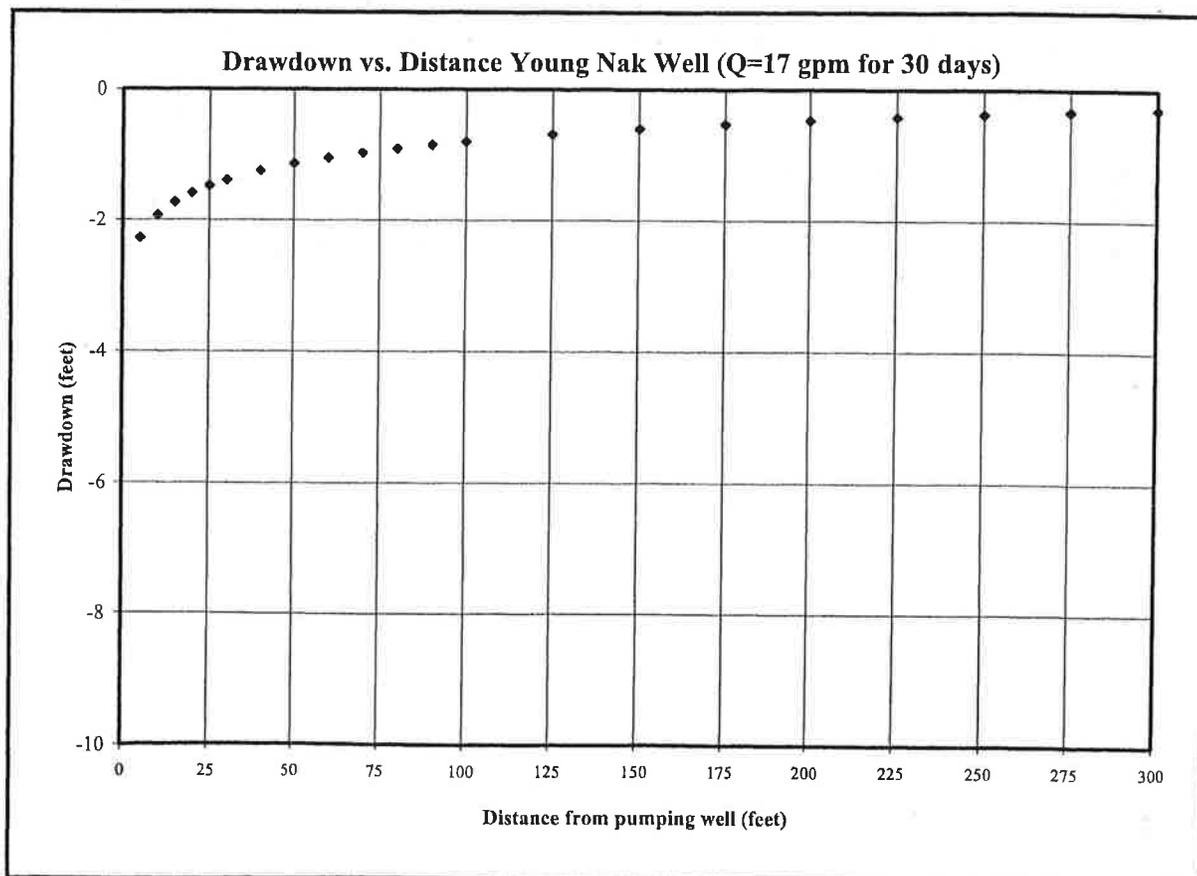


Figure 4. Plot of drawdown curve for sustained maximum pumping during summertime peak-use periods following the proposed improvements.

Proposed Changes in Groundwater Use and Effects on Quality of Extracted Groundwater

Current water quality tests do not indicate any influence from the existing septic leach fields at the site. Bacteria were not detected in the groundwater sample collected in April of 2006 (< 1.1 MPN per 100 mL) and nitrate was detected at concentrations of 0.84 mg/l (significantly lower than the primary drinking water maximum contaminant level of 45 mg/l) and likely representative of background conditions.

The existing leach field near the restroom east of the well is of greatest interest in terms of the quality of extracted groundwater. The exact location and elevation of this leachfield is unknown, and additional information on leachfield location would be required to determine possible interference with the cone of depression created by pumping at the water supply well. Additional sampling conducted shortly after a high-use summer weekend is also recommended if continued use of this existing septic system is considered. If the location of this leachfield is found to be within the potential capture zone of the well, then use of this system must be discontinued to protect the quality of extracted groundwater. A new wastewater collection and disposal system (WREA, October 17, 2006) has been conceptually designed for the expanded Center and it is expected that the existing septic systems will be abandoned.

The new septic system being designed is several hundred feet away, at approximately the same elevation as the water supply well (WREA, October 17, 2006). This preliminary placement meets Los Angeles County Department of Health Services requirements of a minimum 100 feet separation of leachfield and water supply wells.

Proposed Changes in Groundwater Use and Effects on Water Quality of Riparian Areas

The proposed changes in groundwater use will not likely affect the quality of the groundwater reaching the riparian areas from the septic system, provided that the following conditions, which are fundamental to the conceptual design documented in the WREA report, are met:

- All septic flows at the site are routed to properly sized leach systems designed to accommodate the anticipated peak flow volume on summer weekends.
- All septic flows are routed to a system designed to provide a minimum of 10 ft separation between the leach lines and the historic high groundwater levels.
- All septic leach fields are located at a minimum distance of 50 ft from the boundary of a riparian area.

The Wastewater Collection and Disposal System Report by WREA (October 17, 2006) sets out several permit requirements for on-site wastewater treatment systems, which when implemented will ensure there will be no water quality impacts on groundwater or Riparian Areas. In particular, we concur with the evaluation and likely inclusion of two important aspects of the

proposed system: namely the specialized treatment approaches that can reduce the effluent's nitrate concentrations and the installation of strategically-location monitoring wells). These components can be of particular benefit in safeguarding and tracking water quality changes over time.

5.11 WATER SERVICE

5.11.1 SUMMARY

The project site occurs within Los Angeles County Department of Public Works (LACDPW) Water Works District Number 40 (WWD No. 40). Water is supplied to this district by the California Aqueduct and the Antelope Valley Groundwater Basin. However, the District does not provide water to the project site. Water for the project site would be supplied by an existing on-site well. Based on a conservative assumption of 300 on-site attendees, the Young Nak Retreat Center project would consume approximately 17,600 gallons of water per day (gpd), or about 19.14 acre-feet per year (afy). As defined above, the project proposes to meet this demand through the use of one on-site groundwater well and up to two aboveground storage tanks. In conformance with state law, mitigation is required by law that ensures the formation of a private water company prior to issuance of grading, building, or construction permits. Given the project's water system plans and required mitigation, impacts to the water supply system would be less than significant.

5.11.2 INTRODUCTION

This section addresses impacts to potable water supply and its conveyance to developed portions of the project site. This analysis is based on the Potable Water System Report for the Young Nak Retreat Center, prepared by Water Resource Engineering Associates (WREA). Please reference **Appendix 5.11** of this EIR for a complete copy of this report.

5.11.3 EXISTING CONDITIONS

5.11.3.1 Regional Water Supply

The LACDPW, WWD No. 40 supplies portions of the Antelope Valley with potable water. The two main sources of this water supply to WWD No. 40 are the California Aqueduct and the Antelope Valley Groundwater basin. Water from the California Aqueduct is purchased from the Antelope Valley-East Kern Water Agency (AVEK). The AVEK Water Agency has an allocation for purchasing 141,400 afy from the California Aqueduct. To augment water supplies derived from the California Aqueduct, local groundwater is pumped from County-owned wells located throughout the valley. At present, the project site relies entirely on well water from the Antelope Valley Groundwater Basin to meet potable water needs.

5.11.3.1.1 On-Site Water Distribution System

The project site is situated in a rural portion of the Antelope Valley and is partially developed. There is no developed water distribution or reclamation system on, adjacent to, or in the vicinity of the project site. Scattered residential land uses that occur in the vicinity of the proposed project site acquire potable water through the use of private on-site water wells. Potable water is supplied to the existing project site by a groundwater well that was present when the property was purchased. As demonstrated by the sustained pumping test at 17 gpm that produced 3.1 feet of drawdown over 4.8 hours, the existing water supply well has been able to provide potable water for the Center without any long term stress to the aquifer.

Records indicate that in 2004 total pumping was 1,004,100 gallons (3.1 acre-feet), and in 2005 total pumping was 1,550,662 gallons (4.8 acre-feet). Over this same two year period winter time average daily consumption ranged from 1 gpm to 2 gpm (1,440-2,880 gpd), and summer average daily consumption ranged from 2.25 gpm to 5 gpm (3,240-7,200 gpd). This range, from winter to summer, directly reflects the number of visitors to the center, with summer weekend retreats representing maximum occupancy and consumption rates. The maximum average summertime pumping rate of 5 gpm is only 30 percent of the pumping capacity of the existing groundwater pump.

The existing well is approximately 110 feet deep. An existing 20,000 gallon aboveground water tank which is filled by a pump lift station is located close to the existing restrooms. Another aboveground water tank (capacity and location yet to be determined) would be used to store water for fire suppression.

5.11.3.1.1 Ground Water Quality

Water quality samples collected near the end of a pumping test indicated that groundwater quality is very good, and is considerably better than drinking water standards as defined by the California Department of Health Services Title 22 regulations. In all cases, concentrations of various parameters detected in the water sample from the property's water well were substantially lower than the corresponding primary or secondary Maximum Contaminant Level (MCL) which indicates clear compliance with these regulatory limits.

5.11.3.2 Regulatory Framework

5.11.3.2.1 Antelope Valley Areawide General Plan

The Antelope Valley Areawide General Plan is a component of the Los Angeles County General Plan and was adopted by the County Board of Supervisors on December 4, 1986. The Plan contains the following policies related to water supply and distribution within the Antelope Valley.

- • Develop and use groundwater sources to their safe yield limits;
- • Use imported water, when available, to relieve overdrafted groundwater basins and maintain their safe yield for domestic uses outside of urban areas; and
- • Encourage utilization of floodwaters and reclaimed wastewater for groundwater recharge.

5.11.3.2.2 California Safe Drinking Water Act

The California Safe Drinking Water Act (CA SDWA) was passed in 1986 to build on and strengthen the federal Safe Drinking Water Act (SDWA). The CA SDWA authorizes the State Department of Health Services (DHS) to protect the public from contaminants in drinking water by establishing maximum contaminant levels (MCLs) that are at least as stringent as those developed by the U.S. Environmental Protection Agency (U.S. EPA), as required by the federal SDWA. The California DHS lists all contaminants that may have an adverse health effects and may occur in public water systems, including all the substances for which federal MCLs exist.

5.11.3.2.3 Regional Water Quality Control Board

The State Water Resources Control Board (State Board) and its nine Regional Water Quality Control Boards have primary responsibility for the protection of water quality in California. The State Board sets statewide policy for the implementation of state and federal laws and regulations. The Regional Boards adopt and implement Water Quality Control Plans (Basin Plans) which recognize regional differences in natural water quality, actual and potential beneficial uses and water quality problems associated with human activities. The project site is located within the jurisdiction of the Lahontan Regional Water Quality Control Board (RWQCBLR).

5.11.3.2.4 California Code of Regulations

The proposed project would be required to comply with Title 17, 20, 22 and 24 of the California Code of Regulations. Title 17 of the California Code of Regulations requires that a state-certified water system operator be retained to operate the water system. Title 20 of the code addresses Public Utilities and

Energy and includes appliance efficiency standards that promote water conservation. Title 22 sets water quality and specific testing methodology and equipment standards for potable water. Title 24 contains California Building Standards, including the California Plumbing Code (Part 5) that promotes water conservation.

5.11.3.2.5 Senate Bill 221 and Senate Bill 610

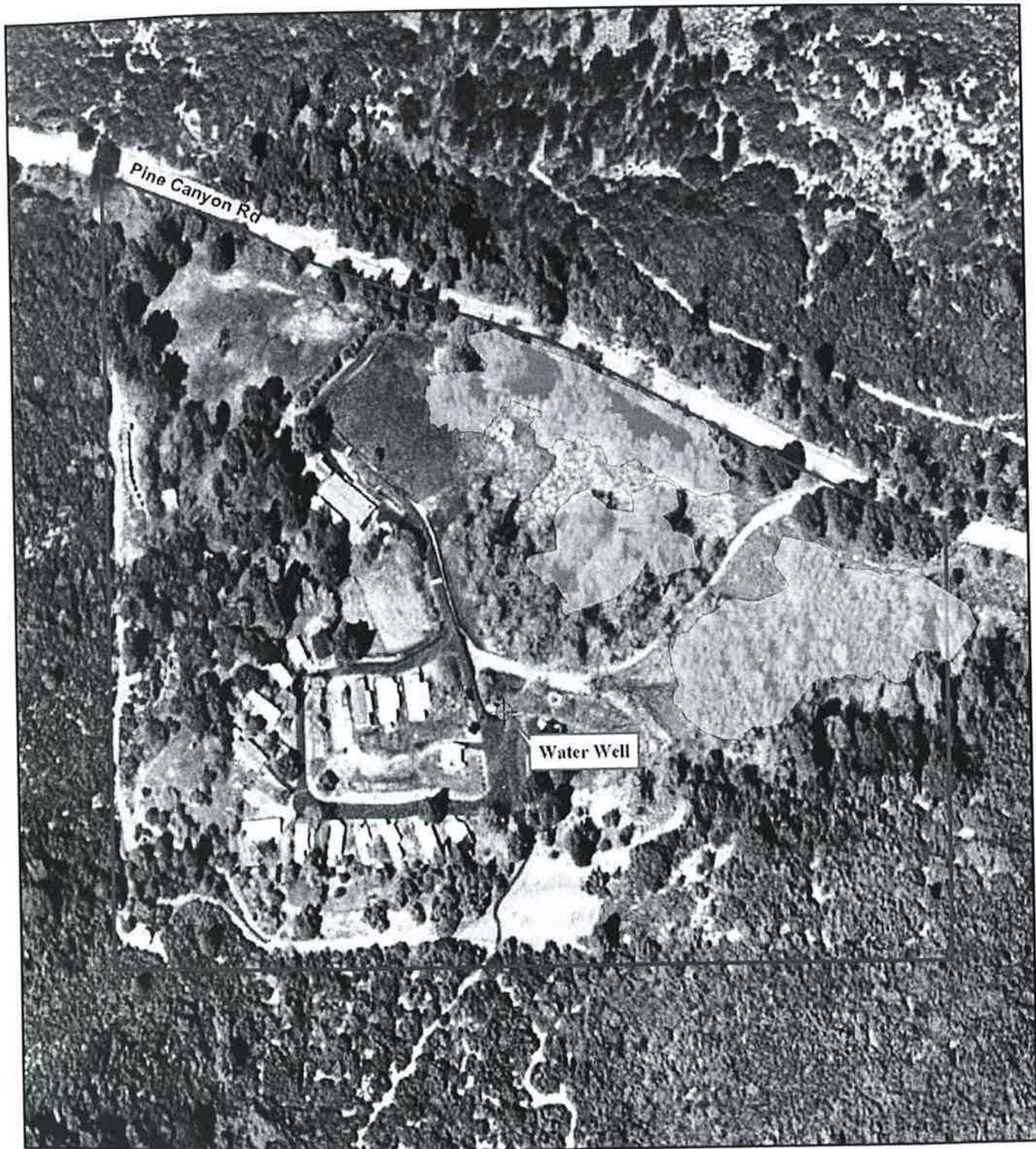
These pieces of legislation amend existing California law regarding land use planning and water supply availability by requiring more information and assurance of supply than is required by an agency Urban Water Management Plan (UWMP). As of January 1, 2002, the law requires retail water providers such as the AVEK Water Agency and County WWD No. 40 to demonstrate that sufficient and reliable supplies are available to serve large-scale developments prior to completion of the environmental review process and approval of large-scale development projects. Given definitions in Senate Bill 221 and 610, the proposed Young Nak Project is not considered a large-scale development and is not subject to the requirements of either legislative act.

5.11.4 PROJECT IMPACTS

5.11.4.1 Project Improvements

The Young Nak Retreat Center Project would result in the construction of additional facilities at an already developed site. These facilities would include: a parking area, an office building, a dormitory, a cafeteria, a swimming pool, an outdoor amphitheater, a chapel retreat center, and up to four meeting rooms. The project would also result in the paving of several existing dirt roads. These proposed structures would total 32,150 square feet.

Potable water is currently supplied by an existing groundwater well that was present when the property was purchased. The well is approximately 110 feet deep and its location is shown on **Figure 5.11-1, Water Well Location Map**. Information on subsurface lithology at the site is limited because of the lack of a state well driller's report and lithologic log for the well on the property. Percolation tests conducted by Professional Geotechnical Consultants, Inc. in February of 2006 provide information on soil and shallow alluvial sediment properties, to depths of approximately 15-20 feet below ground surface. No additional groundwater wells are proposed as part of the project.



Legend:

- ⊕ Water Well
- Riparian Habitat
- ▭ Parcel Boundary



SOURCE: Integrated Water Resources, Inc. – November 2006

FIGURE **5.11-1**

Project Site Water Well Location

5.11.4.2 Thresholds of Significance

The following thresholds for determining the significance of impacts related to water service are contained in Appendix G of the *California Environmental Quality Act Guidelines* (2005). Impacts related to water service were analyzed using the following thresholds:

- 1. **Would the project require or result in the construction of new water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?**
- 2. **Are there sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?**

5.11.4.3 Impact Analysis

5.11.4.3.1 Project Analysis: Need for New or Expanded Water Treatment Facilities

The applicable threshold of significance is listed below followed by analysis of the significance of any potential impacts. Mitigation measures are also identified that would reduce or avoid potential impacts.

Threshold 1: Would the project require or result in the construction of new water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Analysis: It is anticipated that the water distribution network for the proposed development would consist of a system of buried pipelines designed in conformance with County of Los Angeles adopted codes, standards and regulations. As described previously in this section, water quality associated with the existing well exceeds standards set forth by the California Department of Health Services Title 22 regulations. While the proposed water supply system would not require or result in the construction of new water treatment facilities or expansion of existing water treatment facilities, the increased number of visitors would require additional storage tanks for storing extracted well water.

5.11.4.3.2 Conclusion Without Mitigation

Not Significant.

5.11.4.3.3 Mitigation Measures

While the project would not require or result in the construction of new water treatment facilities, it is anticipated that expansion of existing storage facilities would be required. The following mitigation measure is recommended to minimize impacts associated with additional storage tank installation at the site.

5.11-1 Prior to conducting any grading activities at the project site, the applicant shall develop and submit a water distribution plan to the County for review and approval.

5.11.4.3.4 Conclusion Without Mitigation

Not Significant.

5.11.4.4 Project Analysis: Are Sufficient Supplies of Water Available?

The applicable threshold of significance is listed below followed by analysis of the significance of any potential impacts.

Threshold 2: Are there sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

5.11.4.4.1 Water Demand

Analysis: It is anticipated that the annual groundwater pumping after the project improvements are implemented would increase the current average groundwater pumping rate of approximately 4,000 gallons per day (or 4.4 acre-feet per year) to an annual average of 17,600 gallons per day (or 19.14 acre-feet per year), inclusive of a 10 percent contingency. Total drawdown at the property edge, assuming a circular cone of depression, would be less than 1 foot. This is a conservative estimate because it does not take into account the fact that the wastewater disposal system would be percolating nearly this entire amount back into the aquifer. This process would tend to diminish the drawdown effect from well pumping. It should be noted that this additional water supply would be captured by the septic system and subsequently conveyed back to the aquifer via the leach line systems. Because water would return to the aquifer, there would be very limited "consumptive use" (i.e., net removal of water from the aquifer). Therefore, the net change in total groundwater at and near the project site would be negligible.

The existing groundwater well is capable of producing, for sustained periods, 17 gpm or 24,500 gallons per day, which provides 20 percent additional capability over anticipated peak demand. In addition, the Center may install additional water supply storage tanks to support the high use weekends and reduce

demand on the water well. The presence of greater water supply storage would allow for lower, but more sustained, pumping rates over the summer months, which would minimize any effects on groundwater levels.

Utilization of water conservation measures including such measures as the installation of waterless urinals, and low-flow toilets and showerheads and educational measures for visitors, would serve to minimize water supply needs and groundwater extraction at the site.

Increased pumping rates associated with the proposed project would create a larger groundwater depression in the vicinity of the water well during the periods (primarily the summer months) corresponding with the increased water demand. Based upon the aquifer characteristics calculated in the "Aquifer Characteristics and Analysis" section of this report, an analysis of the average effect of using a sustained maximum pumping rate (17 gpm) for an extended period (30 days) indicates that total drawdown would be less than 1 foot at a distance of 100 feet from the well, and less than half a foot at the distance of the wetlands. In addition, as stated above, the groundwater depression would likely be considerably asymmetric. This asymmetry is generated from the steep terrain to the south of the well, the source of the majority of the well's groundwater supply, compared to the relatively flat terrain near to and north of the well. This asymmetry would tend to lessen the anticipated drawdown in the riparian wetlands area.

The proposed Young Nak project would accommodate visitors on a consistent but somewhat variable basis throughout the calendar year, with a larger number of visitors expected during the spring and summer months. Population on site would range from approximately 60 people to a maximum of 250 people. As a result, water demand would vary accordingly. **Table 5.11-1, Water Demand – Young Nak Retreat Center**, illustrates the projected water demand for the proposed project. It is projected that all domestic water usage would be for individual uses of potable water. Uses would include full-time residents, part-time population of retreat visitors, and include such activities as drinking, handwashing, personal food preparation, swimming, showering and toilet flushing. There would be no commercial uses of potable water. As shown, the proposed project would generate a demand for potable water of approximately 17,600 gallons (average) per day or 19.14 afy.

**Table 5.11-1
Water Demand – Young Nak Retreat Center**

Water Use	Average Water Demand (gal/day)	Water Demand (afy)
Domestic		
Individual	16,000	17.4
Commercial	N/A	N/A
Non-Domestic		
Landscape Irrigation	N/A	N/A
10% Usage Contingency	1,600	1.74
Total Project Water Demand	17,600	19.14

Source: IWR Inc. 2006.
afy = acre-feet per year

Proposed changes in groundwater use would not be expected to affect overall water supply for the project site. Given the capacity of on-site well of 17 gpm (currently, the project site uses 5 gpm), sufficient water is available to serve the domestic and non-domestic water use requirements of the proposed project, and impacts associated with water availability are not considered significant.

5.11.4.4.3 Conclusion Without Mitigation

Not significant.

5.11.4.3.3 Mitigation Measures

The project would not require construction of new water supplies. However, the following mitigation measure is recommended to ensure the integrity of the existing on-site well.

5.11-2 Prior to conducting any grading activities at the project site, the applicant shall develop and submit a water distribution plan to the County for review and approval.

5.11.4.3.4 Conclusion Without Mitigation

Not Significant.

5.11.5 CUMULATIVE IMPACTS

Consultation with the County of Los Angeles Department of Regional Planning indicates that no projects are known to occur within 1 mile of the proposed project site. Since an on-site water supply system would be used, this project would not have the potential to interact with other approved, planned or reasonably foreseeable projects, and cumulative impacts associated with water supply are not considered significant.

5.11.5.1 Conclusion Without Mitigation

Not significant.

5.11.6 UNAVOIDABLE ADVERSE IMPACTS

System design, review and reporting required by the state and County of Los Angeles would ensure that the projects would not impact groundwater supply, and water is currently available to supply the project. Impacts would not be considered significant.

Education

*Bachelor of Science Biology,
University of California,
Riverside, 1993*

*Master of Science Botany,
University of California,
Riverside, 2000*

Joe Decruyenaere

Senior Project Manager

Mr. Decruyenaere is a Senior Project Manager with thirteen years of professional experience in biological research, environmental impact analysis and project management. He has been involved in the preparation and review of over a dozen environmental impact report projects and has conducted impact analysis and provided guidance on the development of mitigation monitoring plans for dozens of others. Mr. Decruyenaere has conducted a wide variety of field-related work, including, general biological surveys, focused sensitive plant surveys, vegetation mapping, small mammal trapping, passerine bird nesting studies, and water chemistry sampling and testing.

Representative Professional Experience

- Served as biologist in the Los Angeles County Department of Regional Planning, advising Department staff, the Regional Planning Commission and the Los Angeles County Board of Supervisors on biological resource issues associated with County-granted development entitlements. Developed and implemented mitigation/monitoring plans. Coordinated Significant Ecological Areas Technical Advisory Committee (SEATAC) and Environmental Review Board (ERB) activities. Reviewed environmental documents, biological technical reports, and landscaping plans.
- Conducted laboratory, field and data processing work for the USDA Forest Service, performing chemical analyses of soil, water, and atmospheric deposition samples for nutrient content, chiefly nitrogen compounds. Performed data analysis and sample collection. Developed experimental designs for studies of atmospheric nitrogen deposition and its effect on plant, soil, and water processes.
- Taught undergraduate biological laboratory and discussion sessions in Human Genetics (non-majors course), Introduction to Ecology and Evolution, Introduction to Cell and Molecular Biology, and Plant Anatomy.
- Performed chemical analyses using atomic absorption, mass spectrophotometry, gas chromatography, and radionuclide analysis. Designed and conducted experiments in microbial metabolism of selenium compounds in soil, utilizing sterile techniques. Assisted in design and construction of a sampling array for a tracer study to characterize flow behavior of a constructed wetland. Designed apparatus for microbial culture and sample collection.
- Conducted small mammal trapping in coastal sage scrub habitats for a number of research projects, including background studies for the San Diego Multiple Species Conservation Program.



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- Conducted point counts, nest surveys, passerine life-history data collection and transect/quadrant vegetation sampling related to reproductive studies of sage-steppe passerines in southern Idaho, within the Raptor Research Technical Assistance Center for the National Biological Survey.



IMPACT SCIENCES, INC.

Larry Lodwick

Senior Wetland/Regulatory Specialist

Mr. Lodwick is a Senior Biologist with Impact Sciences and has 30 years of professional experience in the fields of natural resource assessment and management, environmental and wetland regulations, natural resource impact assessment, mitigation plan development, and monitoring. His other specialties include botanical surveys, wetland and riparian functional assessments, mitigation planning, and permitting coordination. Mr. Lodwick also conducts environmental impact assessments, natural resource inventories, and wildlife habitat assessments. Currently reviews biological documents being prepared by the company prior to submittal to clients or public agencies.

Mr. Lodwick's professional experience includes three and a half years of environmental consulting in Southern California, where he conducts botanical surveys, wetland and riparian corridor delineations and permitting, and oak tree surveys; several years with the Alaska Department of Environmental Conservation (ADEC), representing the department on the Alaska Coastal Management and Permit Reform Working Groups which reviewed land use plans and policies for the state's coastal region and served on the Juneau Wetland Management Task Force; and as a Natural Resources Biologist, developing natural resource management plans for the Texas State Park System.

Mr. Lodwick has a Masters of Science degree from Baylor University in Biology (Wetland Ecology) and has authored a number of papers and articles on wetland ecology, vegetation, and regulations. Mr. Lodwick is trained in the use of the Washington State Wetland Functional Methodology; was on the Oregon wetland assessment team for the development of a Hydrogeomorphic Methodology (HGM) for Willamette Valley wetlands; and was trained in the HGM methodology for the south coast region of Santa Barbara County, California. Mr. Lodwick has conducted wetland functional assessments, using HGM, Wetland Evaluation Technique, and other accepted methods for numerous sites. Mr. Lodwick has conducted reviews of wetland projects for the cities of Vancouver and Battle Ground Washington, and for Clark and Skagit Counties in Washington for compliance with local, state, and federal regulations.

Representative Project Experience

Impact Sciences, Inc.

- Conducted a wetland/stream jurisdictional delineation, which has been verified by the federal and state resource agencies, and a Sensitive Ecological Areas Constraints Analysis, submitted to the County of Los Angeles, for the 12,000-acre Centennial site of the Tejon Ranch, Los Angeles County. These reports were required for determining the constraints and opportunities for the site's planning and approval processes and assisted with the project site planning for the protection of high value natural resource areas.
- Prepared a Wetland and Dune Restoration and Creation Plan, including monitoring and adaptive management sections for mitigating impacts to a coastal residential development project referred to as North Shore. The plan utilized GPS mapping of existing resources and constraints to the mitigation process. Worked with the project's attorney and engineer to achieve a plan that will be submitted to regulatory agencies.

- Conducted and prepared a detailed vegetation analysis of hydrophytic species cover and dominance on the North Shore site in the City of Oxnard, with the goal of establishing the size and configuration of wetlands under the jurisdiction of the California Coastal Commission. A report was prepared for, and accepted by, the Coastal Commission staff.
- Conducted a wetland delineation on a section of land on the University of California, Santa Barbara campus that was proposed for the construction of an alumni center. The delineation involved a site adjacent to the campus lagoon and required detailed soils and vegetation analysis. The wetland was mapped using a GPS backpack unit.
- Prepared a Resource Management and Monitoring Plan monitored the implementation for Parker Ranch, a site being developed as a residential development. The project involves the replacement of numerous oak trees and enhancement of coastal sage scrub habitat on site.
- Prepared a Resource Management and Monitoring Plan monitored the implementation for the Las Virgenes Unified School District, for the site development of a new middle school. The project involves the replacement of numerous oak trees and the creation and enhancement of a riparian corridor on the school site.
- Prepared a wetland/riparian jurisdictional delineation and currently involved in the planning and permitting for an equestrian ranch in Simi Valley. The project involves crossings of several streams and the avoidance of habitat for several listed sensitive status species.
- Prepared a Resource Management and Monitoring Plan for Plum Canyon Phase 1C, a residential development associated with several jurisdictional streams and numerous sensitive species in the City of Simi Valley.

The JD White Company, Inc.

- Participated in several development phases of the approximately 500-acre Washington State University, Vancouver Campus, from initial site assessment and resource delineations to site plan development and monitoring. Campus developed involved numerous wetland and riparian issues under Clean Water Act and Endangered Species Act (salmonid) jurisdiction. Section 404 permits and local wetland and habitat permits were obtained.
- Developed a natural resources restoration plan for the nearly 200-acre Environmental Science Center at the Rock Creek Campus of Portland (Oregon) Community College involving numerous wetland and upland habitat types. Estimated costs and time frame for the implementation of the project.
- Conducted a survey for the Ute's ladies-tresses orchid (*Spiranthes diluvialis*) along an 80-mile Bonneville Power Administration electric transmission corridor in northern Idaho, for to supplement a biological assessment for power line vegetation maintenance by the agency.
- Conducted a juvenile salmonid habitat and benthic invertebrate survey; outlined permitting issues and presented the project at a pre-application conference with federal and state agencies, and reviewed site development plans for a Skamania County recreational water access site on a backwater of the Columbia River.
- Directed a wetland functional assessment for the Port of Vancouver (Washington) involving numerous floodplain wetlands, in preparation of site development and anticipated

mitigation. Coordinated with staff to calculate mitigation needs and an initial strategy for mitigation for wetland impacts.

- Developed an alternative strategy to the City of Vancouver, Washington's tree management program, for which an established country club and golf course would be authorized by the City to continue to manage their landscape without the need of additional tree removal permits required by a new ordinance.
- Conducted wetland delineations and permitting, and prepared and monitored mitigation plans for four electrical substations and the connecting transmission lines corridors for Clark Public Utilities, Clark County, Washington.

Publications

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Lodwick, L.N. 1992. Generalized Plant Communities and Specific Community Descriptions. Newsletter of the Salal Chapter of the Washington Native Plant Society. Vol. 2(3): 6.

Education and Certifications

Bachelor of Arts, Biology, Central Methodist College, Fayette, Missouri 1971
Master of Science, Biology, Baylor University, Waco, Texas 1975

Professional Affiliations

Society of Wetland Scientists

Holly J. Hill

Staff Biologist

Ms. Hill serves as a Staff Biologist for Impact Sciences, Inc. She has managed and/or conducted a variety of terrestrial studies including endangered species surveys, floristic surveys, biological assessments, biological constraints analyses, alternatives analyses, mitigation monitoring plans, wetlands delineations, and environmental document preparation. Ms. Hill has 12 years of field experience in the San Joaquin Valley. She has participated in federal, state, and private projects related to endangered species and the agricultural and petroleum production industries.

Representative Project Experience

- Conducted habitat evaluations, focused, and State/USFWS protocol surveys for special-status wildlife species on Tejon Ranch in Kern County including San Joaquin kit fox, blunt-nosed leopard lizard, western spadefoot, Tehachapi slender salamander, and California tiger salamander. Conducted over 150 hours of spotlight surveys for San Joaquin kit fox. Monitored active construction sites to ensure suitable protection of special-status species. Conducted general and focused botanical surveys for special-status plants and vegetation communities and assisted with the development of the **Tecuya Creek Restoration Plan for Tejon Ranch**.
- Participated in numerous presence/absence surveys for the San Fernando spineflower, the slender-horned spineflower and short-joint beavertail cactus on **Newhall Ranch**, Los Angeles County, California. Also conducted oak tree surveys.
- Conducted protocol-level burrowing owl surveys and implemented exclusion mitigation plans for projects in San Bernardino County, California. Tasks included presence/absence surveys to identify burrowing owls and potential owl burrows, the installation of exclusionary devices and construction monitoring.
- Conducted biological tasks related to the endangered species program at the **Department of Energy's Elk Hills Naval Petroleum Reserves I and II**, Kern County, California. Duties included mammalian and herpetological trapping, data collection and monitoring of federal and state listed endangered species including San Joaquin kit fox, blunt-nosed leopard lizard, and giant kangaroo rat. Kit fox work included spotlighting, live trapping, radio telemetry, scent stations, den observations, den excavations, and necropsies on kit fox mortalities. Conducted surveys for special-status plants, and monitored revegetation sites to determine revegetation success. Also conducted preconstruction monitoring for all petroleum-related production projects (drilling, pipelines, seismic surveys, road construction, etc.) and developed programmatic educational materials for the public. Regularly used global positioning system (GPS), recorded weather data for sixteen weather stations, and assessed habitat damage (fire and hazardous materials).

Education and Certifications

Land Use and Planning Certificate Candidate, University of California Santa Barbara
Associate of Arts, Taft College
Wildlife Law Training – Bakersfield College
Archaeological Training – University of California Riverside
Certified Project Wild Facilitator – California Department of Fish and Game
Wetland Delineation Certification – Wetland Training Institute, MT
Stream Corridor Restoration Training – Federal Interagency Stream Restoration Working Group
Certified SCUBA Instructor (Ret.) – NAUI, SSI

Andrew McGinn Forde

Project Wildlife Biologist

Mr. Forde holds a research degree in wildlife biology from the University of St Andrews, Scotland and has more than 5 years of professional experience as a wildlife biologist working in California. His skills include breeding bird surveys, general wildlife surveys, species-specific surveys, population modeling, wildlife capture, radio telemetry techniques, habitat assessment, and vegetation mapping in support of environmental documentation under the California Environmental Quality Act (CEQA), the California Fish and Game Code, the National Environmental Policy Act (NEPA), and the endangered species acts.

Mr. Forde holds a 10(a)(1)(A) Permit, which allows him to conduct focused surveys for quino checkerspot butterfly and southwestern willow flycatcher. He also operates under a Memorandum of Understanding, which allows him to conduct surveys for desert tortoise.

Mr. Forde is also a certified wetland delineator (U.S. Army Corps of Engineers, #2128). He has attended advanced wetland courses and workshops related to federal and state wetland permitting. Since becoming a certified wetland delineator, Mr. Forde has completed a number of wetland delineations and has prepared Section 404 applications (U.S. Army Corp of Engineers), Section 401 applications (Regional Water Quality Control Board), and Section 1600 Streambed Alteration Agreements (California Department of Fish and Game).

In addition, Mr. Forde has written numerous biological reports, prepared and reviewed sections for CEQA and NEPA documents, has edited scientific papers for the United States Geological Survey, and written short communications for press release.

Representative Professional Experience

- **Regents of the University of California, Orange County, CA** – Conducted general wildlife and focused surveys for burrowing owl, white-tailed kite, loggerhead shrike, California horned lark, and black-tailed jack rabbit, conducted breeding bird surveys, and assisted permitted biologists with focused surveys for coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher on the University of California's Irvine campus. A pair of gnatcatchers fledged three young at the site. Mr. Forde also provided technical advice during client meetings, managed on-call requests for construction monitoring, and prepared internal memoranda and supporting documentation.
- **SWCA Environmental Consultants, Flagstaff, AZ** – Conducted focused surveys, nest searching and nest monitoring activities for southwestern willow flycatcher (WIFL) at more than 10 sites located along the Lower Colorado River, Bill Williams River, Gila River, and the All American Canal. The objectives of the project were to locate, via broadcast and observation, territorial WIFLs, re-sight color banded birds, find and monitor WIFL nests, and band non-banded adults and their nestlings. Primary duties included conducting surveys, re-sighting color banded birds, nest searching, and nest monitoring. More than 100 WIFLs were detected during the surveys including more than 25 territorial males, 12 pairs, and 7 nests.

- **Glorious Land Company, Riverside County, CA** – Reviewed more than 150 publications on the ecology of the desert tortoise and prepared a paper for presentation to the USFWS during Section 7 Consultation. The paper provided the rationale for an alternative survey methodology specifically developed for the 10 square mile project site. The USFWS accepted the methodology and approved the use of hand-held GPS units for navigating transects, which is a departure from the traditional method of using PVC pipe. The survey consisted of more than 2,200 1-mile transects on the project site and more than 80 linear miles in the zone of influence around the project site. Responsibilities included logistics, the selection and management of the ten-man team, conducting the surveys, and preparation of the report.
- **State of California, Department of Parks and Recreation, San Diego County, CA** – Mr. Forde conducted general wildlife surveys and provided an assessment for the potential occurrence of threatened, endangered, and sensitive species within Chino Hills State Park.
- **Playa Capital, Los Angeles County, CA.** – Conducted general wildlife and breeding bird surveys, provided technical assistance during client meetings, managed on-call requests for construction monitoring and clearance surveys, and prepared internal memoranda and supporting documentation. Mr. Forde also conducted surveys and prepared reports to support applications for coastal development permits. The project site is adjacent to the Ballona Wetlands, is controversial, and has strong opposition. Mr. Forde responded to opposition concerns on behalf of the client and prepared reports in support of potential litigation.
- **Unocal Corporation, Ventura County, CA** – Unocal is proposing a 3000-acre development in the Simi Valley. The property is located on the north side of the 118 Freeway and is one of only a few areas with remaining open space on the north side of the freeway. The freeway cuts between the Santa Susana Mountain Range and the Simi Hills. A major issue associated with the project was the idea of a wildlife corridor between the Santa Susana Mountains and the Simi Hills. Mr. Forde conducted field investigations into the connectivity of the Unocal property with the Simi Hills and to the Santa Susana Mountains. Mr. Forde reviewed more than 100 publications on the use of wildlife corridors by mountain lions and other large mammals and a number of recent studies conducted along the 101 Freeway, the 118 Freeway, and Highway 23. Mr. Forde also wrote a paper discussing the current function of the property as a wildlife corridor.
- **Metropolitan Water District, Los Angeles County, CA** – Conducted preliminary field surveys, habitat assessment, and analyzed potential environmental and biological issues associated with a proposed 8-mile subsurface groundwater barrier and prepared the Initial Study/Mitigated Negative Declaration.
- **The Glorious Land Company, Riverside County, CA** – Conducted general wildlife surveys at four one-mile square properties east of Indio in the Sonoran Desert and provided an assessment for the potential occurrence of desert tortoise. Eight tortoises were located during the surveys and evidence suggested that bighorn sheep also frequent the properties.
- **Big Canyon Country Club, Orange County, CA** – Conducted breeding bird surveys and provided technical assistance during the modification of a golf course pond.

- **Florida Light and Power, San Bernardino County, CA** – Collected data on the use of evaporation ponds by birds at a solar power plant in the Mojave Desert, collected invertebrates for selenium analysis, and prepared a report with the findings.
- **The Planning Center, Orange County, CA** – Conducted field surveys, habitat assessment, vegetation mapping, and analyzed potential biological issues associated with the proposed expansion of water utilities in the City of Walnut, City of Diamond Bar, Rowland Heights, and City of Industry and prepared the Initial Study/Mitigated Negative Declaration.
- **City of Malibu, Ventura County, CA** – Conducted preliminary field surveys, habitat assessment, and analyzed potential environmental and biological issues associated with a proposed pedestrian footbridge and trail system at Las Flores Canyon Park and prepared the Initial Study/Mitigated Negative Declaration.
- **Los Angeles Department of Public-Works, Los Angeles County, CA** – Conducted general wildlife surveys, breeding bird surveys, provided technical assistance, and provided an assessment discussing the potential for the occurrence of endangered, threatened, or sensitive species.
- **Level 3 Communications, San Diego and Imperial counties, CA, and Yuma County, AZ** – Participated in field surveys for special status species including desert tortoise, burrowing owl, flat-tailed horned lizard, and arroyo toad during the installation of a fiber optic network between San Diego, CA and Yuma, AZ.

Wetland Delineations

- **Playa Capital, Los Angeles County, CA** – Mr. Forde assisted with wetland delineations in and around areas of the Ballona Wetlands and prepared reports in support of applications for coastal development permits.
- **Regents of the University of California, Orange County, CA** – Mr. Forde delineated wetlands on a 40-acre site at the Irvine campus and prepared Section 404 (U.S. Army Corp of Engineers), Section 401 (Regional Water Quality Control Board), and Section 1600 Streambed Alteration Agreement (California Department of Fish and Game) applications.
- **Rox Consulting Group, San Bernardino County, CA** – Mr. Forde delineated wetlands on a 100-acre site in Calimesa and assisted the writing of the report.
- **County of Orange, Orange County, CA** – Mr. Forde assisted with wetland delineation at Dairy Fork Creek near Laguna Hills and prepared Section 404 (U.S. Army Corp of Engineers), Section 401 (Regional Water Quality Control Board), and Section 1600 Streambed Alteration Agreement (California Department of Fish and Game) applications.
- **Regents of the University of California, Orange County, CA** – Mr. Forde assisted with wetland delineations on a 75-acre site at the Irvine campus and prepared Section 404 (U.S. Army Corp of Engineers), Section 401 (Regional Water Quality Control Board), and Section 1600 Streambed Alteration Agreement (California Department of Fish and Game) applications.

- **Big Canyon Country Club, Orange County, CA** – Prepared Section 404 (U.S. Army Corp of Engineers), Section 401 (Regional Water Quality Control Board), and Section 1600 Streambed Alteration Agreement (California Department of Fish and Game) applications.

Botanical Surveys, Vegetation Mapping, and Restoration Projects

- **Glorious Land Company, Riverside County, CA** – Mr. Forde participated in mapping vegetation at four one-mile square properties east of Indio in the Sonoran Desert. Vegetation communities included Creosote-Bursage Scrub, Creosote-Brittlebush Scrub, Box Thorn Scrub, Palo Verde-Ironwood Woodland, and Palo Verde-Ironwood Scrub.
- **State of California, Department of Parks and Recreation, San Diego County, CA** – Mr. Forde assisted with the mapping of vegetation along nine linear miles of potential road alignment within Chino Hills State Park.
- **Ralph Osterling, Riverside County, CA** – Participated in an oak tree survey and led part of the team for the proposed development of a 6500 acre parcel in accordance with the County of Los Angeles Oak Tree Ordinance. More than two hundred and fifty trees tagged and mapped using a Trimble GPS. The team determined the condition of each tree using guidelines set out by the International Society of Arboriculture in a *Guide for Plant Appraisal*.
- **Level 3 Communications, San Diego and Imperial counties, CA, and Yuma County, AZ** – Participated in field surveys for special status species including Algodone's sunflower, Jacumba milk vetch, Pierson's milk vetch, San Diego ambrosia, San Diego thorn mint, slender pod jewel-flower, Tecate tar plant, and Wiggin's croton.
- **Los Angeles Department of Public-Works, Los Angeles County, CA** – Participated in a focused plant survey for the slender-horned spineflower and managed the fieldwork related to the restoration of native habitat.
- **Marshall Canyon Regional Park, Riverside County, CA** – Participated with habitat assessments and focused surveys for Nevin's barberry, slender mariposa lily, and Parry's spineflower for a small housing development in the foothills of the San Gabriel Mountains.

Research Experience

- **Central Valley Habitat Joint Venture, Sacramento County, CA** – The Central Valley Habitat Joint Venture is a multi-agency partnership that includes the USGS, the California Waterfowl Association, the CDFG, Ducks Unlimited, the National Audubon Society, and The Nature Conservancy. Mr. Forde participated in the program in an effort to identify habitat use by a range of waterfowl species including northern pintail, green-winged teal, mallard, and white-fronted geese. Responsibilities included capture using rocket-fired nets and box traps, age and sex classification, attaching transmitters, and tracking movements using aerial and land based telemetry techniques. Location data was determined by triangulation and by the use of Remote Data Systems, Global Positioning Systems, and Geographic Information Systems.

- **United States Geological Survey, Yolo County, CA and California Department of Fish and Game, Sacramento County, CA** – Mr. Forde participated in research specifically aimed at developing a reliable methodology to index the population of the Pacific Coast population of band-tailed pigeons and to document behavior associated with mineral gravelling and its relationship to nesting ecology. Responsibilities included capture using rocket-fired nets and box traps, age and sex classification, attaching transmitters, tracking movements, and locating nests using aerial and land based telemetry techniques. Location data was determined by triangulation and by the use of Remote Data Systems, Global Positioning Systems, and Geographic Information Systems.
- **Ventana Wilderness Sanctuary, Monterrey County, CA** – Mr. Forde was involved with the Californian Condor Recovery and Reintroduction Program at Los Padres National Forest. Responsibilities included pre-release conditioning, release, tracking movements using land based telemetry techniques, behavioral observations, habitat use, trapping and handling for replacement of radio transmitters and collecting blood samples, and assisting with supplemental feeding program.
- **Ventana Wilderness Sanctuary, Monterrey County, CA** – Monitoring Avian Productivity and Survivorship. Collected data related to demographic parameters, reproductive success, survival, and migration of riparian birds. Responsibilities included capture using mist-nets, species identification, age and sex classification, measuring morphological characteristics, behavioral observations, point counts, nest searching and monitoring, territory mapping, and habitat assessment.
- **University of California, Davis, Raptor Center, Yolo County, CA** – Mr. Forde participated in the rehabilitation and release of federal and state-listed raptors including burrowing owl, northern spotted owl, elf owl, great gray owl, bald eagle, golden eagle, Swainson's hawk, among others and participated in a burrowing owl reintroduction program. Responsibilities included capture and handling, performing physical examinations, collecting blood samples, assisting veterinarians during surgeries and other procedures, providing medication and specialized diets, and conditioning birds for release.

Education

Animal Biology/University of St Andrews, St Andrews, Scotland
Higher National Certificate/1993/Biology/Stow College, Glasgow, Scotland

Wildlife Workshops

Sensitive Reptiles & Amphibians of Southern California (The Wildlife Society, 2003)
Blunt-Nosed Leopard Lizard Identification (The Wildlife Society, 2003)
Fairy Shrimp of California (Mary Belk, 2003)
Sensitive Butterflies of San Diego County (Faulkner and Klein, 2003)
Desert Tortoise Survey & Handling Techniques (The Desert Tortoise Council, 2002)
Southwestern Willow Flycatcher (Southern Sierra Research Group, 2002)
Owl Survey Techniques (Kern River Preserve, 2002)
Desert Mammals (The Desert Institute, 2002)

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echniques (University of California Davis, 1999)
fication (Ventana Wilderness Sanctuary, 1998)

and Regulatory Workshops

Advanced Wetland Delineation & Management (Richard Chinn Environmental, 2003)
Wetland Delineation & Management (Richard Chinn Environmental, 2002)
Navigating Federal & State Permits for Developments in California's Waters (University of California Los Angeles, 2002)
The Basics of the California Environmental Quality Act (Association of Environmental Professionals, 2002)
A Systematic Approach to the California Environmental Quality Act (Ultrasystems Environmental, 2001)
A Systematic Approach to the National Environmental Policy Act (Ultrasystems Environmental, 2001)

Jeff Johnson
Senior Biologist

Mr. Johnson is a senior biologist with Impact Sciences and has 13 years experience working in the environmental field. Previously, he worked for the Department of Defense as a natural resources program manager at a Naval Weapons Station where he was responsible for managing numerous wildlife research and compliance projects. In the course of his management for the Navy, he prepared and reviewed Biological Assessments and lead formal and informal consultations, as per Section 7 of the Endangered Species Act, in conjunction with a National Wildlife Refuge on Navy owned land. For several years, he acted as NEPA program manager and has considerable experience with the project review process and written documents, as required by this process.

While employed with Impact Sciences, Mr. Johnson has been involved in the preparation of several Environmental Impact Reports and conducted several biological constraints analysis for the use in preliminary project planning.

Mr. Johnson jointly managed a National Wildlife Refuge with the U.S. Fish & Wildlife Service. He developed and implemented the natural resources management plan that prescribes projects and studies involving a variety of scientific techniques and data collection. Mr. Johnson has successfully negotiated and authored, on behalf of the Navy, a Memorandum of Understanding (MOU) with the U.S. Fish & Wildlife Service for management of the Seal Beach National Wildlife Refuge located on Naval Weapons Station Seal Beach. This MOU diffused a long-standing conflict between the Navy and the Service regarding stewardship responsibilities.

Representative Project Experience

- **D.R. Horton, residential development**, Biological Constraints Analysis – Acted as senior biologist in the preparation of a biological constraints report for the development of 400 housing units on a parcel of native land. Client contact is Senior Vice-President of Planning, Dan Boyd.
- **Del Webb California Corp., Sun City Shadow Hills Development**, Biological Resources Section of Environmental Impact Report, City of Indio – Acted as senior biologist in charge of analyzing field data and writing the biological resources section of the EIR including impact analysis of a 806-acre development project.
- **Naval Weapons Station Seal Beach** – While working at Naval Weapons Station Seal Beach, Mr. Johnson actively managed breeding populations of two endangered bird species. He monitored the breeding success and development management strategies to ensure success into the future. His management duties were to assess project impacts, develop mitigation measures, determine appropriate predator control actions and enhance the surrounding habitat. Contact is U.S. Fish & Wildlife Service Refuge Manager, John Bradley.

Education

Bachelor and Master of Science, General Biology with an emphasis in Ornithology

Keith W. Babcock

Associate Principal

Mr. Babcock is Director of Biological Services at Impact Sciences, Inc., and is a wildlife biologist with over 13 years of experience in both wildlife biology and project management. He has directed, managed, or conducted a broad range of terrestrial wildlife research and studies, biological resource inventories, sensitive species surveys, environmental impact assessments, biological constraints analysis, habitat conservation/management plans, and mitigation monitoring plans for a variety of private and public sector clients in virtually every major habitat type in California. Mr. Babcock has a thorough understanding of the California Environmental Quality Act, both State and Federal Endangered Species Acts, and state and federal regulations and permits involving biological resources. He has worked on over 200 environmental compliance projects, including EIRs, EISs, Section 10(a) Permits, Habitat Conservation Plans, Section 7 consultations, Section 404 Permits, and Streambed Alteration Agreements. His biological expertise includes knowledge of a wide range of terrestrial organisms and ecological relationships, with particular emphasis on general ornithology, raptors, threatened and endangered species, and wildlife movement corridors.

Representative Project Experience

Environmental Compliance

- Managed and participated in field investigations, data collection, and preparation of the biological resources assessment portion of EIRs for the California Department of Corrections for proposed prison facilities throughout northern and central California. Significant issues included potential impacts on numerous state- and federally-listed threatened or endangered animal species including desert tortoise, San Joaquin kit fox, Swainson's hawk, blunt-nosed leopard lizard, Tipton kangaroo rat, and California red-legged frog. Potential impacts on wildlife movement corridors were also addressed. In some cases, consultations were conducted with the USFWS and CDFG in preparation of the need for a potential federal Section 10(a) Permit and a state Section 2090 Permit.
- Directed and participated in field surveys, data collection, and preparation of biological resources section of an EIR for the approximately 150-acre proposed Woodridge Residential site in Thousand Oaks, California. Important issues included potential impacts on drainages, oak trees, California gnatcatcher, and wildlife movement corridors.
- Directed the biological resources analysis for the proposed Westridge residential and golf course project on approximately 300 acres of open space in northern Los Angeles County. Significant biological issues included oak woodlands and oak trees, raptor foraging habitat, and wildlife movement. A majority of the project site is included within a Los Angeles County Significant Ecological Area (SEA), which required the preparation of a separate biological assessment and impact analysis as well as appearances before a SEA technical advisory committee to present the findings of the analysis and respond to concerns and issues.
- Managed field surveys, data collection, and documentation of sensitive biological resources for a 5,000-acre study area, and participated in preserve area design for a 45,000-acre study

- area, on the Rancho Mission Viejo ranch in south Orange County, California, for inclusion in the Natural Communities Conservation Planning (NCCP) multi-species habitat management program. Directed and participated in focused surveys for more than 15 sensitive species including the California gnatcatcher, coastal cactus wren, least Bell's vireo, yellow-breasted chat, San Diego horned lizard, orange-throated whiptail, many-stemmed dudleya, Palmer's grappling-hook, southwestern pond turtle, arroyo toad, and several raptor species.
- Directed all aspects of the biological resources section of the North Valencia Annexation EIR in the City of Santa Clarita, California. This complex analysis involved potential impacts on two large riparian systems (San Francisquito Creek and Santa Clara River), threatened and endangered species (unarmored three-spined stickleback, least Bell's vireo), riparian and upland habitats, and wildlife movement corridors. The analysis included a riparian buffer study to determine a biologically appropriate upland buffer between proposed development and protected riparian systems to ensure the overall viability of riparian associated wildlife populations. The project involved extensive coordination with ACOE and CDFG regarding permitting for impacts on wetlands and riparian areas.
 - Managed the biological resources section of the Centre at La Quinta EIR for a proposed project in La Quinta, California. Significant issues included potential impacts on several special-status wildlife species including Palm Springs ground squirrel, Palm Springs pocket mouse, Coachella Valley fringe-toed lizard, flat-tailed horned lizard, Coachella giant sand treader cricket, Coachella Valley Jerusalem cricket, burrowing owl, and several special-status plant species. Potential impacts on desert scrub and dune communities were also of issue.
 - Directed and participated in the biological resources analysis and EIR section documentation for the proposed Glenwood Specific Plan on approximately 125 acres in the City of Scotts Valley, Santa Cruz County. Significant biological issues included potential impacts on two threatened or endangered species (Scott's Valley spineflower and California red-legged frog), a species being petitioned for listing (Ohlone tiger beetle) and several other special-status plant and wildlife species, ACOE and CDFG jurisdictional wetlands and riparian areas, heritage trees, wildlife movement, and wildlife habitat. Extensive coordination with CDFG, ACOE, and USFWS was required, as well as participation in several public hearings. The project involved the development of several unique mitigation measures, including a preserve for the Ohlone tiger beetle and several special-status plant species.
 - Managed all field studies and documentation efforts for the biological resources assessment and impact analysis component of the 4,200-acre Specific Plan Area 8 EIR for the City of Moorpark, Ventura County. Field evaluations included focused surveys for a number of sensitive plant and animal species, a wildlife movement corridor analysis, tree surveys, and wetland delineations. Meetings were conducted with individuals of the USFWS, CDFG, and other environmental interest groups to gain consensus on field survey methodology and results. All biological information was incorporated into a Geographic Information System (GIS) for impact analysis and land use planning.
 - Directed and participated in the biological resources analysis for a Mitigated Negative Declaration for a water main and telecommunications line extension at San Francisco International Airport. Biological issues include potential impacts on California red-legged

frog and San Francisco garter snake, both federally-listed wildlife species. The Negative Declaration tiered off of the Airport Master Plan Program EIR.

- Directed and participated in field investigations and documentation of the biological resources inventory and impact assessment component of a statewide EIR for proposed electrified fences at 29 state prisons throughout California. Tasks involved determining species at risk of electrocution, managing baseline assessments of habitats and species at each prison site, developing creative measures to mitigate impacts, and consulting with state and federal resource agencies. Coordinated with CDFG and USFWS staff from various regions throughout the project. Also assisted in the management of, and participated in, a similar investigation for two prisons in the state of Washington.
- Directed and participated in field surveys and documentation for the biological resources component of a Mitigated Negative Declaration for a seismic upgrade project of a 15-mile portion of the Mokelumne Aqueduct in San Joaquin and Contra Costa Counties. Directed subconsultants to perform wetland delineations, coordinated field verifications and meetings with ACOE, CDFG, and USFWS, and managed all aspects of a Section 404 ACOE wetland fill permit, a Section 7 Consultation with USFWS, and a Section 1600 Streambed Alteration Agreement with CDFG. Potential impacts of the project on the biological resources associated with three major rivers and two sloughs were addressed.
- Directed and participated in the biological resources assessment for the EIR on updates to the Land Use and Circulation Elements of the Hercules General Plan. Biological issues for this program-level EIR, which tiered extensively from the City's General Plan Update EIR, included potential impacts to riparian resources, special-status plants, California red-legged frog, raptors, and wildlife movement corridors.
- Managed and participated in the field survey design and methods of focused surveys for the federally-listed endangered desert tortoise on a site proposed for a new state prison in eastern Los Angeles County. The survey effort included characterizing and mapping suitable habitat for the tortoise as well as for other special-status species, including Mohave ground squirrel and San Joaquin antelope squirrel. Consultations were conducted with the USFWS and CDFG in preparation of the need for a potential federal Section 10(a) Permit and a state Section 2090 Permit.
- Managed and participated in field surveys, data collection, and preparation of a biological assessment for potential impacts on the federally-listed Threatened California gnatcatcher as a result of a proposed project in Chula Vista, San Diego County. The biological assessment was used as a basis for a Section 7 consultation with the U.S. Fish and Wildlife Service that resulted in a no jeopardy determination. Informal and formal consultations and meetings with USFWS were conducted throughout the process.
- Managed biological surveys and analysis of potential impacts on the federally-listed Threatened California gnatcatcher on a proposed OHV Park on the Otay Mesa in southern San Diego County for the California Department of Parks and Recreation. Surveys were also conducted to determine the presence or absence of several other special-status plant and wildlife species. An extensive mitigation plan was developed to minimize potential impacts on the gnatcatcher and other special-status species.

- Directed and participated in field surveys and documentation for the biological resources component of an EIR for proposed gravel mining operation in Yolo County. Analysis focused on the potential impacts of out-of-channel mining along Cache Creek, especially with respect to riparian vegetation and stream associated wildlife. Special-status species issues included Valley Elderberry longhorn beetle and Swainson's hawk.
- Prepared the biological documentation necessary for the proposed central coast NCCP in Orange County. The NCCP documentation established plans for The Irvine Company (TIC), the Transportation Corridor Agencies (TCA), the County of Orange, and other affected parties to comply with the NCCP Act of 1992, providing a comprehensive approach to resolving inherent conflicts between the need to protect sensitive and critical coastal sage scrub habitat and wildlife, and the need to proceed with TIC, TCA, and other development projects.
- Managed and participated in the field surveys and documentation efforts for the biological components of several environmental compliance documents in northern California including the Rancho Dorado EIR in El Dorado County, two gravel and rock mining projects in Yolo County, the Roseville General Plan in Placer County, the Palos Colorados EIR in Contra Costa County, the North Rocklin Circulation Element EIR in Sacramento County, and the Paradise Treatment Plant Biological Assessment in Butte County. Issues included potential impacts on vernal pools, wildlife movement corridors, wetlands, sensitive plants, and numerous sensitive animal species including bald eagle, red-legged frog, Valley elderberry longhorn beetle, Swainson's hawk, western spadefoot toad, and California tiger salamander.
- Managed and participated in field surveys, impact analysis, and documentation of an Environmental Assessment of a proposed 15-mile water and gas pipeline corridor in the Mojave Desert of southern California. Focused surveys and habitat analysis for the federally-listed endangered desert tortoise and Mojave ground squirrel were also conducted within the corridor alignment. Consultations were conducted with the USFWS and CDFG in preparation of the need for a potential federal Section 10(a) Permit and a state Section 2090 Permit.
- Directed and participated in the environmental documentation of biological resources for an EIR on the Water Forum Agreement, an agreement between over 20 water purveyors and water districts on the future use and management of water along the lower American River. The project involved the documentation of existing biological resources along the river and an analysis of potential impacts on these resources as a result of projected changes in water flow levels.
- Directed field investigations and managed documentation of the biological resources inventory and impact assessment component of the Big Bear Dam Bridge Route 18 EIR/EIS in San Bernardino County, California. Directed and participated in focused surveys for several sensitive species, including the federally-listed bald eagle, the state-listed southern rubber boa, and the southern spotted owl.

- Managed field studies and documentation of the biological resources component of the 1,500-acre East Orange Specific Plan area in east Orange County, California. Coordinated surveys, evaluated impacts, and developed mitigations for a variety of biological resources, including sensitive species such as California gnatcatcher, western spadefoot toad, many-stemmed dudleya, San Diego cactus wren, and several raptor species.
- Managed field investigations, impact analysis, mitigation planning, and overall biological assessment documentation for several proposed projects within Significant Ecological Areas (SEAs) in Los Angeles County, California. Significant issues included several sensitive plant and wildlife species, sensitive habitat areas, and potential impacts on wildlife movement corridors.
- Managed field surveys, impact analysis, documentation, and project coordination efforts for the biological component of the Stetson Ranch EIR and the Bear Mountain Ski Resort expansion project EIR/EIS in the San Bernardino National Forest. Significant issues included potential impacts on the bald eagle, California spotted owl, mule deer, mountain lion, black bear, and San Bernardino flying squirrel.
- Assisted in the management and preparation of the biological resources assessment for the East Coyote Hills EIR in Orange County, California. Coordinated field surveys and analyses of the onsite population of California gnatcatchers. The assessment resulted in the development of a pre-listing Habitat Conservation Plan (HCP) for the California gnatcatcher that resulted in the issuance of a Section 10(a) Permit pursuant to the federal Endangered Species Act.
- Managed and participated in field surveys, impact analysis, and documentation of an Environmental Assessment of a proposed 20-mile transmission line for SDG&E in Orange County. The project entailed focused surveys for a number of sensitive plant and animal species, an analysis of several alignment alternatives, and an extensive mitigation development, implementation, and monitoring program.
- Participated in developing a Habitat Conservation Plan (HCP) for the federally-endangered Stephens' kangaroo rat for the Metropolitan Water District of Southern California in Riverside County, in accordance with Section 10 of the Endangered Species Act.
- Managed and conducted numerous biological resources inventories and baseline assessments in a variety of habitat types in the counties of Sacramento, Contra Costa, Solano, Yolo, Merced, San Joaquin, Tulare, Fresno, Ventura, Los Angeles, San Bernardino, Riverside, and Orange, California. Issues included potential impacts on vernal pools, riparian habitats, wildlife movement corridors, wetlands, special-status plants, and numerous special-status animal species including bald eagle, California red-legged frog, Valley elderberry longhorn beetle, Swainson's hawk, desert tortoise, California gnatcatcher, San Joaquin kit fox, vernal pool and fairy shrimp, and California spotted owl. Most of these assessments were used in subsequent environmental impact reports and other regulatory documents.
- Managed field investigations and document preparation for biological resources inventory within the 5700-acre Villages of Laguna San Luis proposed project in Merced County, California. Sensitive species surveys included San Joaquin kit fox and burrowing owl.

- Managed a comprehensive biological baseline inventory of habitat types and both common and sensitive plant and wildlife species for a 3,000-acre undeveloped site in western Riverside County owned by the Lockheed Corporation. Focused surveys for sensitive species included the California gnatcatcher, coastal cactus wren, several plant species, and a trapping program for the Stephens' kangaroo rat.

Focused Studies

- Designed and managed a Swainson's hawk radio-telemetry study over an 8,000-acre study area in West Sacramento, California, to determine home range and habitat use of eight pairs of nesting Swainson's hawks. Responsible for overall study design, capture and attachment of radio transmitters on five Swainson's hawks, radio tracking methodology, staffing, and overall data analysis and interpretation. All data was incorporated into a Geographic Information System (GIS) for analysis and presentation. The information obtained was used to evaluate potential impacts on nesting Swainson's hawks and to develop suitable mitigation measures. The project involved coordination between CDFG, the City of West Sacramento, and the applicants during all phases of the study. The information was eventually used as part of a Section 2081 consultation pursuant to CESA.
- Designed and managed wildlife movement corridor studies for four proposed projects in Ventura County and three proposed projects in Orange County, including a 16-mile transportation corridor project. The studies, which involved the use of remote motion-triggered camera, track plates, and others wildlife movement data collection techniques, were designed to identify and quantify target wildlife species using the project sites, identify areas that are used by these species as travel routes, and to evaluate the relative importance of these areas as potential movement corridors. Recommendations on corridor design were also developed to mitigate potential adverse impacts on movement corridors.
- Conducted survey and habitat analysis for burrowing owls on a 30-acre project site in the City of Milpitas. Based on the presence of breeding pair of owls, identified and evaluated that portion of the site most likely to be included within the foraging range of the owls. Developed a mitigation plan for proposed impacts to the owls and occupied habitat, which included the passive relocation of the owls from the site. Directed and participated in the implementation of the owl mitigation measures, including coordination with CDFG.
- Managed a comprehensive wildlife movement corridor study on the 45,000-acre Rancho Mission Viejo ranch in south Orange County, California. Directed and participated in field investigations and assimilation of data from previous studies. Produced a wildlife movement corridor map and documentation of all field work and analysis.
- Designed, managed, and implemented a mitigation and construction monitoring program for a large-scale project potentially impacting breeding burrowing owls in Fresno County, California. Designed and presented educational materials at a pre-construction meeting attended by 40 individuals. Trapped and banded burrowing owls. Coordinated and consulted with the California Department of Fish and Game on all aspects of the program.

- Conducted numerous focused surveys for the federally-listed threatened California gnatcatcher in San Diego, Orange, Los Angeles, and Ventura Counties. Surveys were conducted under a federal USFWS survey permit.
- Directed the surveys for three federally-listed threatened and endangered fairy shrimp species in a large vernal pool complex (over 100 pools) in eastern Sacramento County. Managed subcontractor contracts and directed the compiling of data and information into a document that met USFWS documentation protocols for surveys of fairy shrimp species.
- Managed an analysis of potential impacts of wind turbines on biological resources on a proposed wind energy site in Solano County. The study focused on the potential effects of wind anemometer towers and wind turbine towers on avian species, particularly raptors and migratory birds.
- Directed and prepared a comprehensive raptor management plan for the 1,500-acre East Orange Specific Plan area and a 3,000-acre dedication area in Orange County. The plan included an analysis of foraging and perch habitat enhancement strategies, nest box and nest platform design criteria and placement, and plan monitoring and evaluation.
- Directed and participated in a focused survey for Swainson's hawks and burrowing owls for the Department of Public Works, City of Davis. An analysis of potential impacts on habitat for these species, consultation with CDFG, and development of measures to mitigate potential impacts were also conducted.
- Directed and managed a comprehensive survey for mule deer on the 1,500-acre East Orange Specific Plan area for The Irvine Company in Orange County. Analyses included descriptions of population density, habitat use, and distribution.
- Served as field investigator and principal author of a biological resources assessment for a U.S. Navy development project in Mono County, California. Conducted a survey for mule deer and specifically addressed potential impacts on mule deer migration areas.
- Served as field investigator for a comprehensive great blue heron breeding and foraging study in East Orange County, California. Responsibilities included retrieving great blue heron chicks from nests, attaching radio transmitters and leg bands, and radio-tracking fledged herons throughout Southern California.
- Conducted field surveys and completed associated descriptive analyses for the presence of habitat and populations of the federally-listed endangered Stephens' kangaroo rat for several development projects in Riverside County, California.
- Participated in development and maintenance of a captive breeding program for the federally-listed endangered bald eagle at the USFWS Patuxent Wildlife Research Center. Assisted in the methodology and analysis of studies on bald eagle eggshell thinning, lead shot poisoning, and breeding behavior.
- Participated in captive breeding programs of the federally-listed endangered black-footed ferret, peregrine falcon, and California condor.

Professional History

Impact Sciences, Inc. - Associate Principal/Director of Biological Services
Michael Brandman Associates - Senior Project Manager, Wildlife Biologist
U.S. Fish and Wildlife Service (USFWS), Patuxent Wildlife Research Center - Biological
Technician

Education

M.S., Business Management, Colorado State University
B.S., Wildlife Biology, Colorado State University

Professional Affiliations

Association of Environmental Professionals (AEP)
Raptor Research Foundation
Society for Conservation Biology
California Swainson's Hawk Technical Advisory Committee

Permits/Certifications

Scientific Collecting Permit, State of California, CDFG
Federal Bird Banding Permit, USFWS
Section 10(a) Permit to Survey for California Gnatcatcher, USFWS
Habitat Evaluation Procedures, USFWS
Certified Scuba

Publications

Babcock, K.W. 1995. Home range and habitat use of breeding Swainson's hawks in the Sacramento Valley of California. *J. Raptor Research* 29(3):193-197.

Josh Phillips

Staff Biologist

Mr. Phillips serves as an analyst on environmental planning projects at Impact Sciences, preparing environmental documents under the direction of the project manager. He has experience preparing EIR sections, Initial Studies, and policy analysis. In addition, Mr. Phillips also has extensive knowledge of data analysis, GIS, and environmental management.

Representative Professional Experience

- Prepared the Initial Study, and currently preparing the EIR for the **De Anza College Facilities** Master Plan. The De Anza College campus is completely developed and is located in a highly urban area. The Facilities Master Plan would accommodate an increase in student enrollment from 25,000 to 32,000 students by the year 2010 and involves construction of new buildings, demolition of buildings, modifications to campus access and circulation, construction of a parking structure, and renovation of campus landscaping. Key issues to be covered in the EIR include local and regional traffic impacts, and impacts on nearby sensitive receptors.
- Prepared the Initial Study, and currently preparing the EIR for the **Foothill College Facilities** Master Plan. The Foothill College campus is completely developed and is located in a suburban/rural area. The Facilities Master Plan would accommodate an increase in student enrollment from 16,000 to 18,000 students by the year 2010 and involves construction of new buildings, expansion of selected buildings, demolition of buildings, modifications to campus access and circulation, construction of a parking structure, and renovation of campus landscaping. Key issues to be covered in the EIR include local and regional traffic impacts, impacts on nearby sensitive receptors, and impacts on biological resources.
- Prepared the Initial Study, and currently preparing the EIR for the **Evergreen Valley College Facilities** Master Plan. The Evergreen Valley campus is generally developed and is located in a suburban/rural area that is experiencing substantial residential development. The Facilities Master Plan would accommodate an increase in student enrollment from 11,000 to 16,000 students by the year 2010 and involves construction of new facilities, renovation of some facilities, construction of a parking structure, and modifications to campus access and circulation. Key issues to be covered in the EIR include local and regional traffic impacts, impacts on nearby sensitive receptors, impacts on biological resources, and the location of the Evergreen fault within the Evergreen campus.
- Preparing the Initial Study/Negative Declaration for the **Chapel Cove** residential project in San Rafael. The project involves the subdivision of the project site into 15 residential lots and 3 parcels, the construction of 13 single-family detached homes and 2 affordable housing units. The 9.41-acre project site is located near the San Rafael Bay, in an area characterized by suburban development and parks/open space, and is bordered to the southeast by a saltwater marsh. Issues of concern include noise and hydrologic impacts.
- While working as a Water Quality Consultant for the East Bay Regional Park District, Mr. Phillips monitored relevant bacteria levels for drinking and surface/recreation water

throughout the **Park District's** jurisdiction. Responsibilities also included analysis and management of data, and public education.

- While at East Bay Municipal Utility District (EBMUD), Mr. Phillips conducted a variety of wildlife surveys including Chinook salmon, steelhead trout, and red-legged frog surveys. Responsibilities also included operation of GPS equipment, analysis of data, and management of GIS databases.

Education

Master of Science, Environmental Science and Management, University of California, Santa Barbara

Bachelor of Science, Environmental Sciences and Biology, University of California, Davis

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Guy P. Bruyey
Entomologist/Biologist

Education

Bachelor of Science, Arizona State University, Tempe, Arizona, 1985.

Continuing education in the biological sciences at Riverside Community College, Riverside, California, 1991-1993. Coursework in General Entomology, Ecology, Organic Chemistry, Microbiology, General and Field Botany.

Experience

1992 - present **Bruyey Biological Consulting**, Hemet, California.
Owner and Principal Biologist.

1990 - present **University of California, Riverside**, California.
Entomology Museum. Research Associate.

1990 - 1995 **University of California, Riverside**, California.
Department of Entomology. Laboratory Technician and Research Associate.

1986 - 1987 **Tierra Madre Consultants**, Riverside, California.
Administrative Secretary and Field Biologist.

Mr. Bruyey has been studying and surveying for insects in southern California for over twenty five years. He is well-versed in southwestern U.S. insect taxonomy, especially Coleoptera (beetles) and Lepidoptera (butterflies and moths). He has a good understanding of plant taxonomy in the southwestern U.S. and is interested in most aspects of natural history. Independent research efforts include the distribution, life history, and pheromone characteristics of buck moths in the genus *Hemileuca* (Lepidoptera: Saturniidae) of the western United States. In addition, he is currently conducting taxonomic studies of jewel scarab beetles in the genus *Chrysina* (Coleoptera: Scarabaeidae). In 1999 and 2000, he assisted Dr. Ronald Cave (Escuela Agrícola Panamericana de El Zamarano, Honduras) and David Hawks (University of California, Riverside) in population studies of *Chrysina* species in Honduras, in part funded by the National Geographic Society.

As an entomological consultant, Mr. Bruyey has been involved in numerous biological resource site analyses in southern California for endangered and/or sensitive invertebrates including (but not limited to) the following:

Quino Checkerspot Butterfly (*Euphydryas editha quino*)
Delhi Sands Flower-loving Fly (*Rhaphiomidas terminatus abdominalis*)
El Segundo Blue (*Euphilotes battoides allyni*)
Palos Verdes Blue (*Glaucopsyche lygdamus palosverdesensis*)
Wandering Skipper Butterfly (*Panoquina errans*)
San Emigdio Blue (*Plebulina emigdionis*)
Tehachapi Silverspot (*Speyeria egleis tehachapina*)

Coachella Valley Giant Sand-treader Cricket (*Macrobaenetes valgum*)
Coachella Valley Jerusalem Cricket (*Stenopelmatus caluilaensis*)
Coachella Valley Grasshopper (*Spaniacris deserticola*)

In addition, Mr. Bruyeya has performed biological monitoring, general biological evaluations and other focused surveys in association with non-invertebrate taxa since 1986, including surveys for Stephens' Kangaroo Rat (*Dipodomys stephensii*), Coastal California Gnatcatcher (*Poliophtila californica californica*), western burrowing owl (*Speotyto (Athene) cunicularia*), Desert Tortoise (*Gopherus agassizii*), and other sensitive and/or threatened mammals, birds, reptiles and plants.

Consulting responsibilities have included the identification of potentially sensitive habitat, mapping, site monitoring, biological inventories, the development of mitigation plans, constraints analyses, and invertebrate surveys involving the establishment of field trials, malaise, flight intercept, pan and pitfall trapping methods, reintroduction programs, mark/recapture studies, host/predator relationships, and literature and museum record searches. Mr. Bruyeya has over fifteen years of experience as a biological (primarily entomological) consultant in southern California and has performed many environmental surveys for city and county agencies, the Metropolitan Water District, Southern California Gas Company, the Department of the Navy, the building industry, and other organizations. Consulting projects have included (but are not limited to) a year-long sensitive and general invertebrate survey on Point Loma for the Department of the Navy in San Diego; presence/absence surveys for the endangered Quino Checkerspot Butterfly (*Euphydryas editha quino*) for the Metropolitan Water District, Southern California Gas Company, and many other clients in Riverside and San Diego Counties; a five-year study of the Delhi Sands Flower-loving Fly (*Rhaphiomidas terminatus abdominalis*) at the San Bernardino County Hospital site in Colton; numerous Delhi Fly surveys at other locations in Ontario, Fontana, Rialto and Colton since 1993; participation in a population monitoring project for the El Segundo Blue Butterfly (*Euphilotes battoides allyni*) for the Los Angeles International Airport; surveys for the endangered Palos Verdes Blue Butterfly (*Glaucopsyche lygdamus palosverdesensis*); a one year sensitive insect study at Owens Lake for the Great Basin Air Pollution Control District; and studies of sensitive and other insects inhabiting the Ballona Wetlands (Marina Del Rey), Big Canyon (Newport Back Bay), Ormond Beach (Oxnard), and Tejon Ranch (Kern County).

Current Section 10(a)(1)(A) Permits

A valid U.S. Fish & Wildlife Service Recovery Permit (Number TE-837439-4) is held for the Quino Checkerspot Butterfly and Delhi Sands Flower-loving Fly, both federally endangered, and the federally threatened California gnatcatcher.

Mr. Bruyeya has held recovery permits for the federally endangered El Segundo Blue Butterfly, Palos Verdes Blue Butterfly and Laguna Mountains Checkered Skipper. These can be updated upon request.

Memberships

Coleopterist's Society
Xerces Society
Lepidopterist's Society
Friends of the Entomology Research Museum, University of California, Riverside
Audubon Society
California Native Plant Society
The Nature Conservancy

Awards

Edmund C. Jaegar Scholarship for Potential Contribution to Field Biology, Riverside Community College, Riverside, California, 1992.

Personal Information Mr. Bruyeya was born February 12, 1962, and enjoys entomological research, invertebrate photography, hiking, and classroom presentations on entomology. References concerning Mr. Bruyeya's entomological experience and publications are available upon request.

Peter H. Bloom
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(714) 544-6147, phbloom1@aol.com

EDUCATION:

- 8/01 - Present. PhD candidate, College of Natural Resources, University of Idaho, Moscow.
Dissertation topic: Natal Dispersal and Philopatry in Sympatric Buteos in Southwestern California.
- 9/79 - 8/89 California State University, Long Beach, M.S. Degree in biology August 1989. Thesis: Red-shouldered Hawk habitat home range and habitat use in southern California.
Graduation With Honors. Outstanding thesis award, School of Natural Sciences.
- 9/71 - 5/79 California State University, Long Beach, B.S. Degree in zoology, May 1979.

PROFESSIONAL HISTORY:

1/77-present: Independent research biologist/consultant. Supervised 1-7 employees/year. Responsible for performing surveys of nesting and wintering birds of prey for the California Department of Fish and Game, Bureau of Land Management, U.S. Forest Service, Department of Defense, and numerous private land owners. Countless general biological surveys. Presently monitoring radio tagged adult California red-legged frogs in Ventura County 4-6 times per month for 6 months. Numerous focused surveys for California gnatcatcher, southwestern willow flycatcher, least Bell's vireo, arroyo southwestern toad, red-legged frog, coast horned lizard, flat-tailed horned lizard, desert tortoise, orange-throated whiptail, coastal whiptail, coast-patched nosed snake, coastal glossy snake, red-diamond rattlesnake, Pacific pond turtle, and Pacific pocket mouse. Numerous general herpetological, small mammal, breeding bird and winter bird surveys in southern California. Translocated several hundred arroyo toads at MCB, Camp Pendleton. Managed sensitive herpetological, mammal and raptor surveys for the Transportation Corridor Agency in Orange County and a raptor status and management plan for Naval Weapons Station, Seal Beach and Fallbrook Detachment. Prepared numerous biological assessments, and worked on several avian research projects in the western U.S., Alaska, Peru, Ecuador, and India. Over 500 hours of helicopter and fixed wing nest survey work and aerial radio tracking of eagles, California condors, hawks and herons. Fiber-optics and electrical powerline installation surveys and construction monitoring.

7/90-present: Research Biologist, Western Foundation of Vertebrate Zoology. Served on Science Advisory Board of the South Orange County Natural Communities Conservation Program. Member of Technical Advisory Committee for the 17,000 acre Nature Reserve of Orange County. Herpetological input into the Orange County environmental GIS and Cleveland National Forest environmental inventory. Management of long-term (30 yr.) raptor ecology study in California. Management of successful Great Blue Heron mitigation project designed to increase numbers of nesting herons through artificial nest platforms. Supervised and performed predator management activities related to protection of California least terns, snowy plovers, and light-footed clapper rails in southwestern California from avian and other vertebrate predators for FWS. Locations included Vandenberg Air Force Base, Naval Weapons Station, Seal Beach, Baticuitos Lagoon, Port of Long Beach, Port of San Diego, and Tijuana Slough National Wildlife Refuge. Supervisor on a two year Caltrans radio-telemetry study of nesting peregrine falcons in southwestern California and their relationship to California least terns. Principal biologist overseeing long-term monitoring of raptors of the Nature Reserve of Orange County. Organized and finished fourth year of a five year MAPS passerine monitoring station.

1/93-present: Research biologist/advisor in India (7 visits) for Indo-US wildlife conservation project sponsored by the U.S. Fish & Wildlife Service International Affairs Office, Indian Government, and Bombay Natural History Society. Responsibilities involve educating local biologists in the various techniques needed to capture birds, and radio-telemetry research.

6/92-present: Orange County Natural History Museum. Designed museum theme and layout including display cases, terrariums, and 108 ft. x 4 ft. mural.

1993-present: Saddleback College, Dept. of Technology and Applied Sciences. Instructor, California Natural History.

1990-present: Dept. of Biology, Calif. State Univ., Long Beach, thesis advisor to two students, C.S.U., Humboldt, one student, and C.S.U., Fullerton, one student.

5/82-6/90 Research Biologist, National Audubon Society. Responsible for writing the grant proposal and ultimately the successful award of two grants totaling \$300,000 for 6 years of full time research on the ecology of southern California raptor populations. Responsible for project management, personnel selection, supervision of 12 volunteers, proposal and budget preparation, method design, data analysis, report writing, and publication of results. Directed the effort to capture all wild free flying California condors for transmitter placement or captive breeding. Radio tracked condors, and conducted contaminant studies involving condors and 180 golden eagles.

5/81-9/83 Research biologist, University of California, Santa Cruz. Principal investigator on a three year study designed to determine the status of goshawk populations in California for the Department of Fish and Game.

1/80-8/81 Research biologist. Trapped, and placed transmitters on great gray owls for the U.S. Forest Service, prairie falcons for the Department of Fish and Game, and peregrine falcons in Peru, South America for the Bodega Bay Institute of Pollution Ecology.

4/79-10/79 Wildlife Biologist. U.S.D.I., Bureau of Land Management. Principal investigator of a study designed to determine the status of the Swainson's hawk in California. Surveyed all semi-arid and desert regions, reviewed literature and museum records, assessed reproduction, banded adults and young, and prepared final report. Resulted in listing of the Swainson's hawk.

1/79-6/79 Research biologist. Camp Pendleton Marine Corps Base. Awarded a contract to survey, and report on the ecology, and distribution of raptors inhabiting the 200 sq. mile base.

6/75-10/79 Biological technician. U.S.D.I., Bureau of Land Management. California and Nevada. Conducted reptile, amphibian, small mammal, and avian surveys of 3.25 million acres of public land as part of a grazing EIS.

PERMITS

Federal Endangered Species Permit (TE-787376-8 Feb. 20, 2002 - Feb. 19, 2005) for Red-legged Frog (transmitters, transponders), Arroyo Southwestern Toad, California Gnatcatcher (banding), Least Bell's Vireo (banding), Southwestern Willow Flycatcher (banding), California Least Tern, Snowy Plover, Peregrine Falcon, Bald Eagle, and Swainson's Hawk. Federal Bird Marking and Salvage Permit. Predator Management Permit. Migratory Bird (Burrowing Owls etc.) relocation permit. Cowbird trapping authorization. Desert Tortoise surveys.

Employee permits: Jeff Kidd (TE-022230-1, Quino Checkerspot Butterfly, Arroyo Southwestern Toad, California Gnatcatcher. Chris Niemela (Quino Checkerspot Butterfly, Arroyo Southwestern Toad, California Gnatcatcher. Jim Luttrell (California Gnatcatcher).

ORIGINAL RESEARCH:

1970-present Coastal southern California. Long term study of the population ecology and biology of the red-tailed hawk, red-shouldered hawk, barn owl, and great horned owl. Supplemental study of the western screech owl, long-eared owl, Cooper's hawk, white-tailed kite, and golden eagle. Twenty-five thousand hawks and owls banded as part of a dispersal, migration, survivorship, and mate/territory fidelity study. Twenty-four year study on Swainson's Hawk in northeast California.

OTHER ACTIVITIES

BOARD MEMBER Orange County Natural History Association 1991-present, Sea & Sage Audubon Society 1985-95, Western Bird Banding Association 1982-84.

PROFESSIONAL MEMBERSHIPS The Wildlife Society (Life), The Raptor Research Foundation (Life), American Ornithologists Union, Cooper Ornithological Society (Life), Association of Field Ornithologists (Life), Western Bird Banding Association (Life), Society for Conservation Biology (Life), Society for the Study of Amphibians and Reptiles, Hawk Migration Association (Life), California Native Plant Society (Life).

PUBLIC SPEAKING Hundreds of presentations to National Audubon Society chapters, professional meetings, and conferences on the subject of raptors, reptiles, amphibians, and natural history including Eilat, Israel, and on the subject of California Condors, by invitation to Milan, Italy.

BOOK REVIEWS The Auk (Johnsgard. 1990 - Hawks, Eagles, and Falcons of North America), Journal of Raptor Research (Wheeler and Clark. 1995 - A photographic guide to North American Raptors), Journal of Raptor Research (Glinski 1998 The Raptors of Arizona).

SCIENTIFIC MANUSCRIPT REVIEWS Journal of Wildlife Management, Journal of Raptor Research, Journal of Field Ornithology, Condor, North American Bird Bander.

NORTH AMERICAN BANDING COUNCIL Raptor Research Foundation representative 1999-Present.

REFERENCES

Dr. Charles T. Collins 562-598-4385
Dr. J. Michael Scott 208-885-6336
Dr. Lee Waian 760-757-6820
Jeff Johnson 805-750-3474